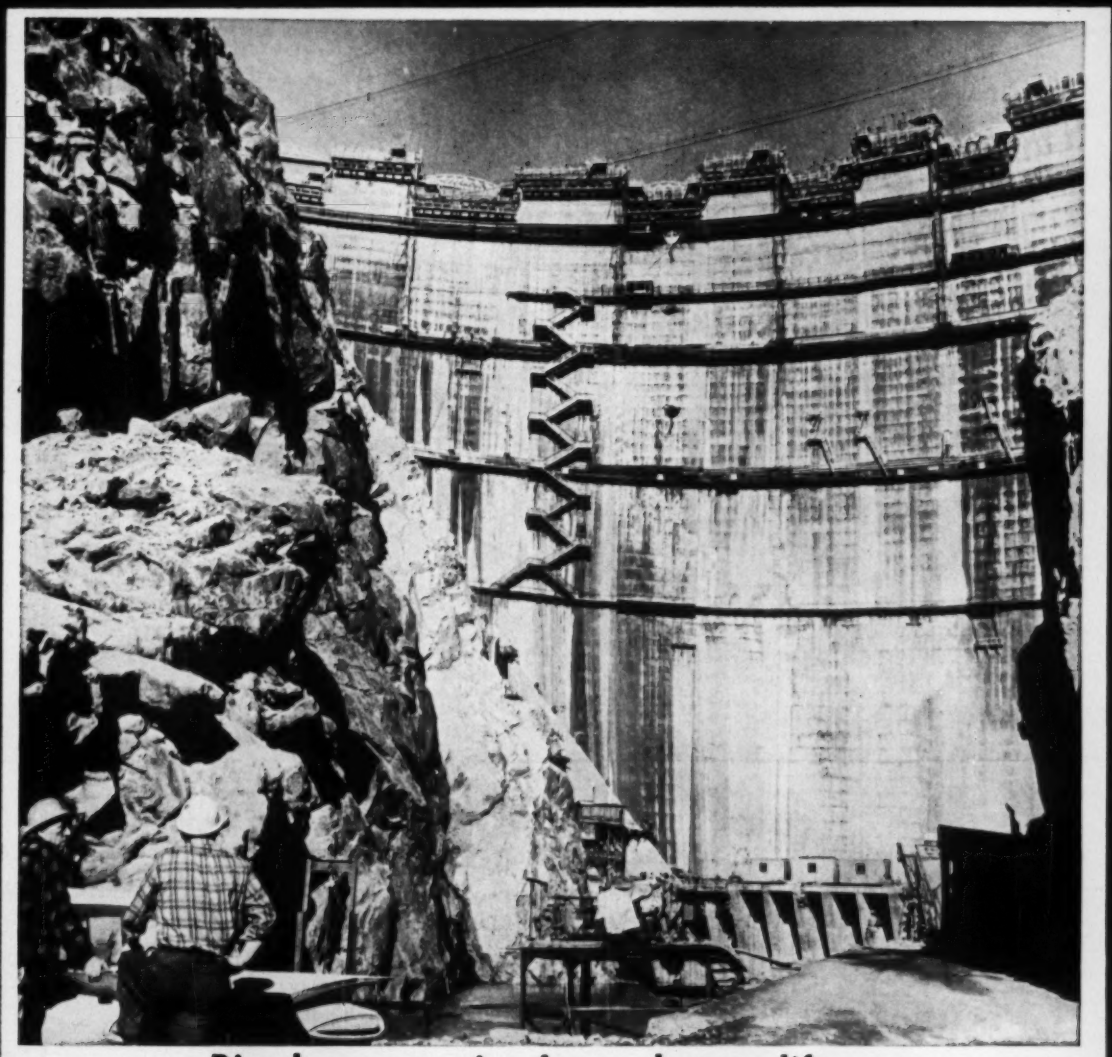
ENGINEERING NEWS-RECORD

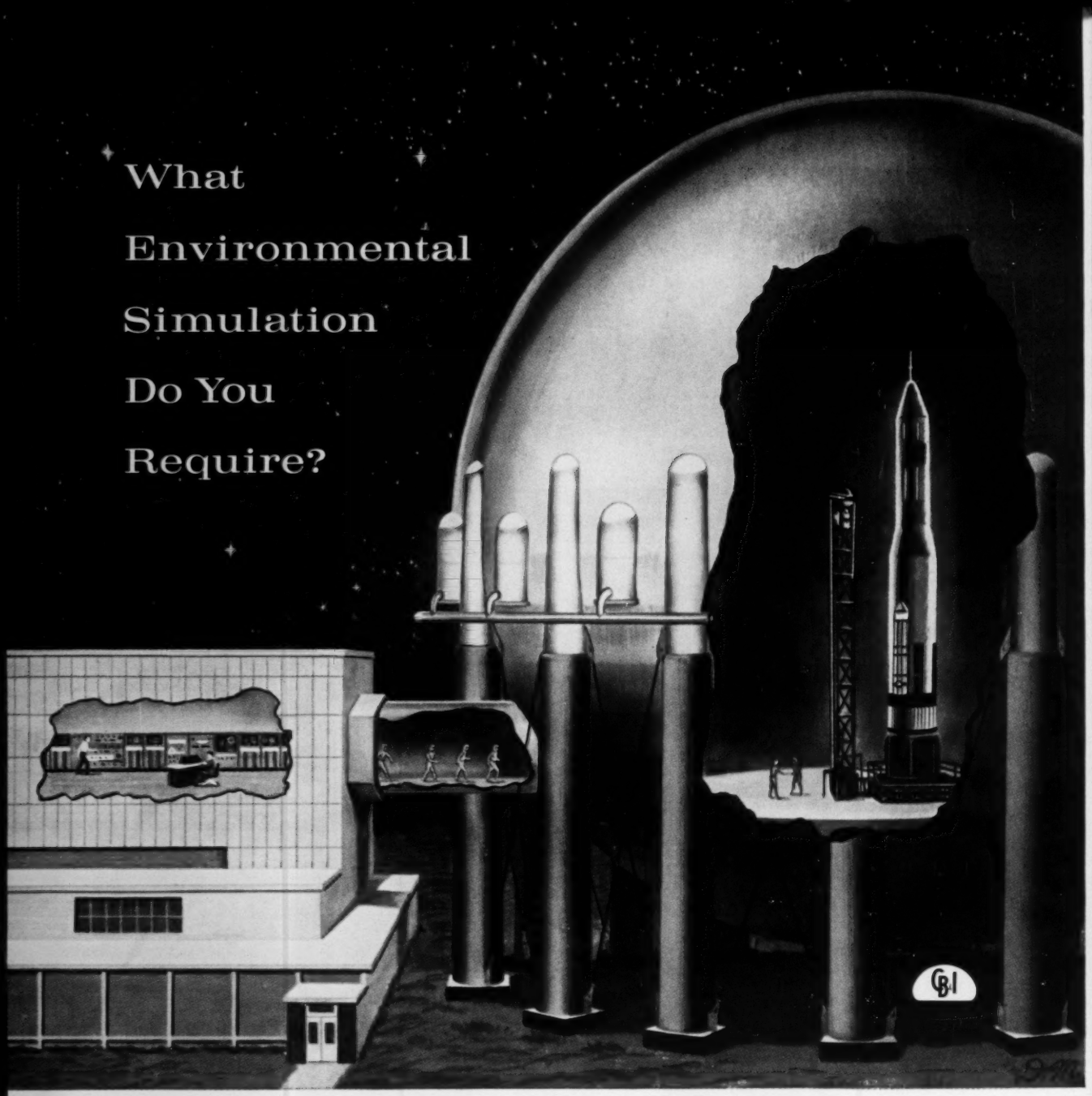


Big dams promise Iran a better life p.38

A McGRAW-HILL PUBLICATIO

STEVENS RICE GS N
UNIV MICROFILMS INC ED
313 N FIRST ST
ANN ARBOR MICH C 4-

What Environmental Simulation Do You Require?



CB&I can provide it

Thanks to earth-bound testing, man will soon enter outer space with a remarkably detailed understanding of the environment he will encounter.

Whatever your requirements are for environmental testing systems and structures, CB&I is particularly well qualified to design and construct the facilities.

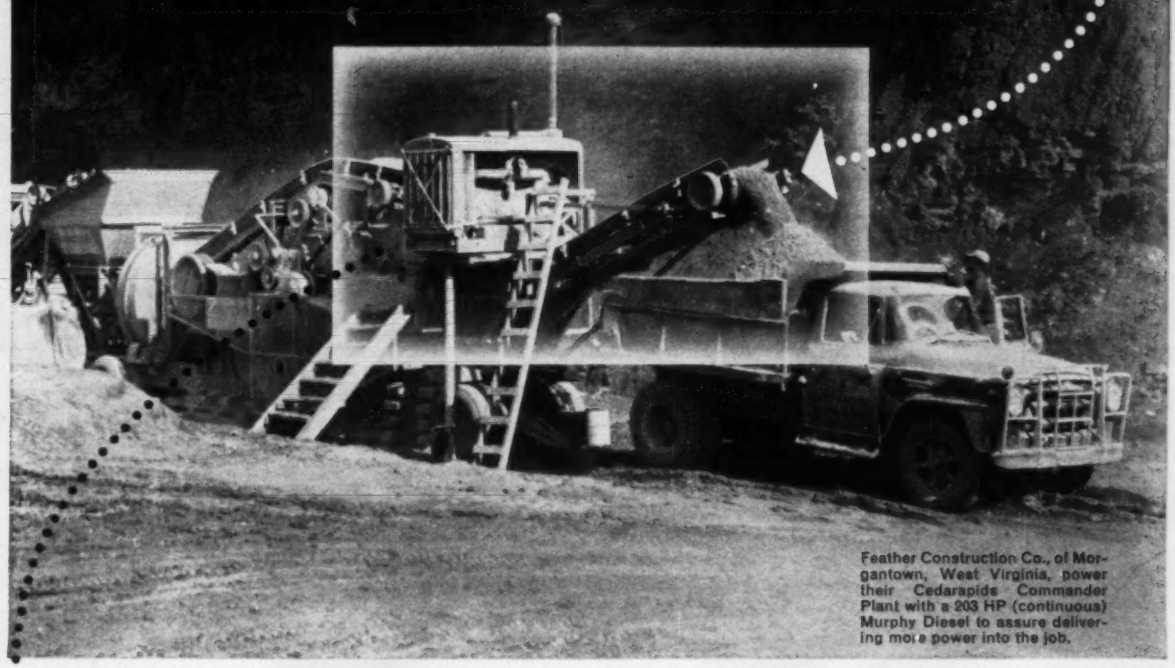
Complete systems for pressure, temperature and motion simulation can be provided.

To learn more about this service, backed by over 70 years of craftsmanship in steel, get in touch with Chicago Bridge & Iron Company, 332 S. Michigan Ave., Chicago 4, Ill. Offices and subsidiaries in principal cities throughout the world.

Serving leaders in the fields of Nuclear Power, Chemistry, Petroleum, Aerospace, Cryogenics, Hydroelectric Power, and Municipal and Industrial Water Supply

CB-614

Profitable Production HERE



Feather Construction Co., of Morgantown, West Virginia, power their Cedarapids Commander Plant with a 203 HP (continuous) Murphy Diesel to assure delivering more power into the job.

demands MORE POWER DELIVERED INTO THE JOB

with a MURPHY MP DIESEL

Take a look at the amount of aggregate coming off this delivery conveyor. That is profitable production! It goes on like this hour after hour, day after day, because all the power from the engine is put *into* the job . . . usable power that's delivered where it counts for maintaining high daily tonnages.

MP Series Murphy Diesel engines are designed and built to react to load changes immediately, with the high rising torque that delivers More Power *into* the job when needed. Murphy Diesels have the ability to take hold of a load and really hang on, to help keep your plant at the right operating speed under the toughest crushing conditions.

Power that's merely *on* the job can't increase your plant's productivity. It's the *total usable power* delivered *into* the job each day which determines that day's production, and profit. Be sure you are getting maximum output from your plant . . . put Murphy MP Power in your job today. Your Murphy Diesel Dealer has full details about Murphy's new MP Concept of Power.

435-N

MURPHY DIESEL

Here's the MP Series line-up for construction

MP SERIES ENGINES AND POWER UNITS —105 HP to 320 HP, 1200 and 1400 RPM

MP SERIES GENERATOR SETS—60 KW to 227 KW

MP SERIES MECH-ELEC UNITS for delivering mechanical or electrical power separately or simultaneously

MP SERIES DUAL FUEL ENGINES—147 to 227 HP

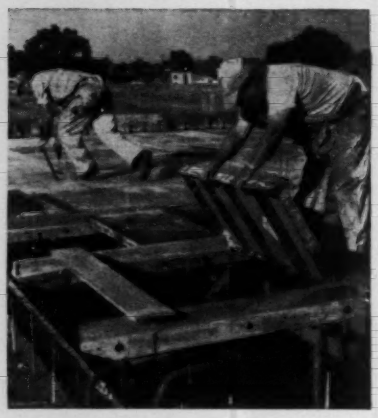
MURPHY DIESEL COMPANY

5321 W. Burnham St., Milwaukee, Wisconsin

SALES . . . PARTS . . . SERVICE

Throughout the Nation

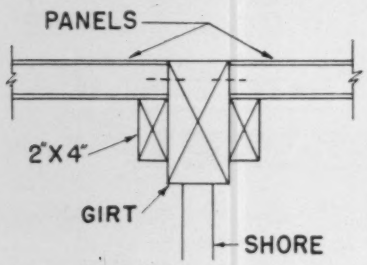
Slab Forming



Symons Steel-Ply Forms Used Twice Per Month

. . . Material Costs Reduced to 10 Cents a Square Foot

Slab forms were stripped in 10 days without disturbing the support shoring; still met specifications calling for 28 days of slab support.



2 x 4's bolted to girt are removed, for ease of stripping.

When constructing apartments on the campus of Stanford University, Howard J. White, Inc. had one big problem . . . how to reduce slab-forming costs. Symons Steel-Ply Forms were the answer.

4 x 6 girts, laid longitudinally with the floor slab, are first set in place on shores and flush with the bottom of the slab. When the slab is poured, it bears directly on the timber girt. Next, 2 x 4's are bolted to the girt to form a ledge. Symons 4 ft. Steel-Ply Panels are dropped in place on the 2 x 4 ledge. No connecting hardware is used . . . carpenters drive a nail through a form-hardware opening to the girt on each panel so that when the 2 x 4 ledges are removed, the panels will not fall.

For the complete story on *slab forming*, just send in your request. Symons Steel-Ply Forms are rented with purchase option.

Symons

SYMONS CLAMP & MFG. CO.

4265 Diversey Ave., Dept. C-1, Chicago 39, Ill.

Warehouses Thruout the U.S.A.

MORE ***SAVINGS*** *FROM* ***SYMONS***

ENGINEERING NEWS-RECORD

EIGHTY-SEVENTH YEAR OF PUBLICATION

A McGraw-Hill Publication • 330 West 42nd Street, New York 36, N.Y. • LOngacre 4-3000

Editor, Waldo G. Bowman

Managing Editor, Arthur J. Fox, Jr.

Senior Editors, Frederick S. Merritt, James B. Sullivan, Leo J. Ritter, Jr.

Transportation—Roads, Bridges, Railways, Airports, Pipelines, Ports
Leo J. Ritter, Jr., Edward M. Young, Jr., Joseph F. Wilkinson

Buildings—Commercial, Industrial, Housing; Codes, Specifications
Frederick S. Merritt, David B. Hill, C. W. Griffin, Jr.

Water—Sanitation, Water Supply, River Control, Power, Irrigation
James B. Sullivan, William W. Jacobus, Jr., Marie Jensen

Business—Management, Labor, Finance, Markets, Contracts, Economics
Robert J. Stinson, Charles J. Harding

Regional Editors
J. Roland Carr, *Chicago, 520 N. Michigan Ave.* (*MOhawk* 4-5800)
Martha Alexander, *Staff Assistant*

Lauress L. Wise, *San Francisco, 255 California St.* (*DOuglas* 2-4600)
Anne Garcia, *Staff Assistant*

Copy—Production
Irwin Landau, Nancy Parkes, John C. Greenough, Robert M. Echols

Presentation
Harry W. Jensen, Robert G. Young

Statistics, Prices, Costs—Business News
Elsie Eaves, *Manager*
Julia Mahoney, *Construction Reports*
Mildred Wetzel, Marian Sciorra, Marie Moravsik
Eleanor Queret, Francine Todisco, Helene Wahlers, Arlene Spielman
James Webber, Ruth Carlson, *Economics*
William P. Larkin, *Prices, Wages, Indexes*
Evelyn Huber, Edith Ostwald, *Statistics*
D. Arlene Ricker, *Unit Prices*

Editorial Research and Indexing
Eva Glerat, Rene Hay, Jane Jacobson

Consulting Editors: **Van Tuyl Boughton, Nathan A. Bowers**

Advertising Sales Manager: **Donald S. Robertson**

Circulation Manager: **Edward F. Bressler**

Washington Bureau, National Press Bldg., Washington 4, D. C. (*REpublic* 7-6630), George B. Bryant, Jr., Chief, Gloria R. Jennings, Alan Adams, Glen Bayless, Roy Calvin, Herbert Cheshire, Anthony DeLeonardis, John Donaldson, Jay Flocken, Boyd France, Clyde Henning, Don Loomis, Daniel McCrary, Gladys Montgomery, Arthur Moore, Burkey Musselman, Seth Payne, Dean Reed, Mort Reichek, Margaret Reid, Caroline Robertson, Thomas Russell, David Secrest, Richard Smith, Vincent Smith, Harry Vandernoot.

Domestic News-Bureaus: Atlanta—1375 Peachtree St., B. E. Barnes, Chief, Frances Ridgeway; **Chicago**—520 N. Michigan Ave., Stewart Ramsey, Chief, Bruce Cross, Eric Aiken; **Cleveland**—55 Public Square, Arthur Zimmerman, Chief, Violet Forsha; **Dallas**—2100 Vaughn Bldg., Marvin Reid, Chief, Lorraine Smith, Mae Brown; **Detroit**—856 Penobscot Bldg., Donald MacDonald, Chief, Sally Ayling, Wesley Perry, Jr., Del Yannatta; **Los Angeles**—1125 W. 6th St., Kemp Anderson, Jr., Chief, Carl Havighorst, Michael Murphy, Marvin Petal, Bill Wallace, Mary Williams, Barbara Lamb; **San Francisco**—255 California St., Jenness Keene, Chief, Donald Winston, Allson Lunt; **Seattle**—6040 Fifth Ave., N.E., Ray Bloomberg.

Foreign News Bureaus: London—John Shinn; **Paris**—Robert Farrell; **Mexico City**—Peter Weaver; **Bonn**—Pete Forbath; **Beirut**—O. M. Marashian; **Tokyo**—Sol Sanders; **Rio de Janeiro**—Leslie Warren; **Caracas**—John Pearson; **Moscow**—Ernest Conine.

Correspondents: In 70 principal U. S. cities and 70 cities throughout the world.
Director of News Bureaus: John Wilhelm; **Managing Editor,** Margaret Ralston.
McGraw-Hill Economics Department: Douglas Greenwald, Manager.

Publisher, Robert F. Boger

MEMBER

ENGINEERING NEWS-RECORD, Vol. 166, No. 11, March 16, 1961

Published weekly by McGraw-Hill Publishing Company, James H. McGraw (1860-1948), Founder. Printed at Albany 1, N. Y. See panel below for directions regarding subscriptions or change in address. **Executive, Editorial, Advertising and Circulation Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y.** OFFICERS OF THE PUBLICATIONS DIVISION: Nelson L. Bond, President; Shelton Fisher, Wallace F. Traendly, Senior Vice Presidents; John R. Callaham, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator. OFFICERS OF THE CORPORATION: Donald C. McGraw, President; Joseph A. Gerardi, Hugh J. Kelly, Harry L. Waddell, Executive Vice Presidents; L. Keith Goodrich, Vice President and Treasurer; John J. Cooke, Secretary. **Subscriptions are solicited only from persons with identifiable commercial or professional interests in construction and building. Position and company connection must be indicated on subscription orders. Publisher reserves the right to refuse unqualified subscription.** United States subscription rate for individuals in the field of this publication $6.00 per year, single copies 50 cents; foreign $20 per year, payable in advance. Second-Class mail postage paid at Albany, N. Y. Printed in U.S.A. Title registered in U.S. patent office.

©Copyright 1961 by McGraw-Hill Publishing Co., Inc. All Rights Reserved.

UNCONDITIONAL GUARANTEE: Our primary aim is to provide subscribers with a useful and valuable publication. Your comments and suggestions for improvement are encouraged and will be most welcome. The publisher, upon written request, agrees to refund the part of the subscription price applying to the remaining unfilled portion of the subscription—if editorial service is unsatisfactory.

SUBSCRIPTIONS: Send subscription correspondence and change of address to Fulfillment Manager, ENGINEERING NEWS-RECORD, 330 W. 42nd St., New York 36, N. Y. Subscribers should notify, publisher *promptly of any change of address, giving old as well as new address, and including postal zone number,* if any. If possible enclose an address label from a recent issue of the magazine. Please allow one month for change to become effective.

Postmaster: Please send Form 3579 to Fulfillment Manager, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

for CIVETTA EXCAVATING, INC.
NEW YORK, NEW YORK

THERE is no tougher digging anywhere than the Manhattan Island schist. We've mentioned it before and it should interest contractors everywhere with tough digging ahead of them, that Northwest Shovels and Pullshovels have given outstanding demonstrations of their digging ability in the hard rock of Manhattan Island jobs.

Here's another one! Civetta Excavating, Inc. is an old timer in New York City digging—and an old timer as a Northwest user. The pictures show their 16th and 17th Northwests—two Pullshovels—a Model 80-D cleaning out a mess of tough rock and a Model 6 digging footings.

Repeat orders from contractors, who know what tough digging is, are the best guarantee that you will get the kind of performance you want.

Northwest advantages for control, smooth swing, travel and high output combine with Northwest dependability to get the job done.

Take a tip from these men that lick Manhattan's backbone into shape. Ask for complete details on the size machine you need.

NORTHWEST

CRANES • SHOVELS • DRAGLINES
PULLSHOVELS • TRUCK CRANES

3/4 to 3 Cu. Yd. Capacity

NORTHWEST ENGINEERING COMPANY
1502 Field Bldg. • 135 South LaSalle Street • Chicago 3, Illinois

P-25-33-LC

LUBE LOGIC Five tips to

How to return stored engines to service

In a previous issue of Lube Logic we gave you an 11-point program designed to protect gasoline and diesel engines during long idle periods. Now we'd like to finish what we started by describing the routine for taking engines *out* of storage and putting them back into action.

1 Where Texaco Rustproof Compound L has been applied to exterior of engine, remove with kerosine.

2 Remove waterproof paper and tape from all openings.

3 Remove spark plugs. Clean them and check the gap settings before replacing.

4 Remove distributor cap and clean Texaco Rustproof Compound L thoroughly from lobe of breaker cams. Replace cap.

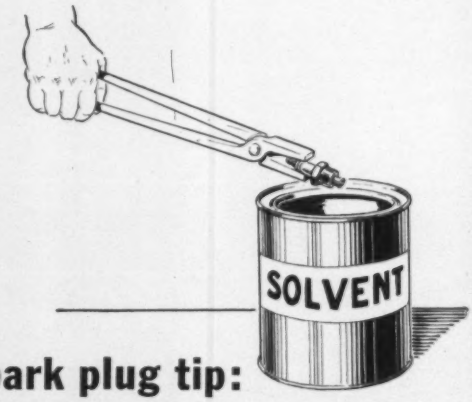
5 Check the level of the crankcase oil. If it's at the full mark, there's no need to drain the oil before operating the engine unless it requires a different grade. If the oil has fallen below the full mark during storage, drain the engine and locate the oil leak, and repair it, then refill with the proper grade of oil, before operating the engine. The first oil change after the engine is back in service should be made in half the usual period.

6 Check the cooling system for leaks, and add water or Texaco PT Anti-Freeze if necessary. It's not necessary to drain and flush if the cooling system was filled with a rust-inhibited anti-freeze before storage.

7 Fill the fuel system, start the engine, and let it run for a while. Check the oil pressure, and check for overheating and oil and fuel leaks.

End-of-shift is the best fueling time

They say there's a time and a place for everything, and for refueling equipment the best time is at the end of each day's work. And here are two reasons why. End-of-shift minimizes the possibility of fuel-tank rusting, because there's no room for condensate to form in a tank that's full of gasoline or diesel fuel. And tank-bottom sediment, stirred up by pumping in fuel, has a chance to settle down overnight, so it won't be drawn into the fuel line.

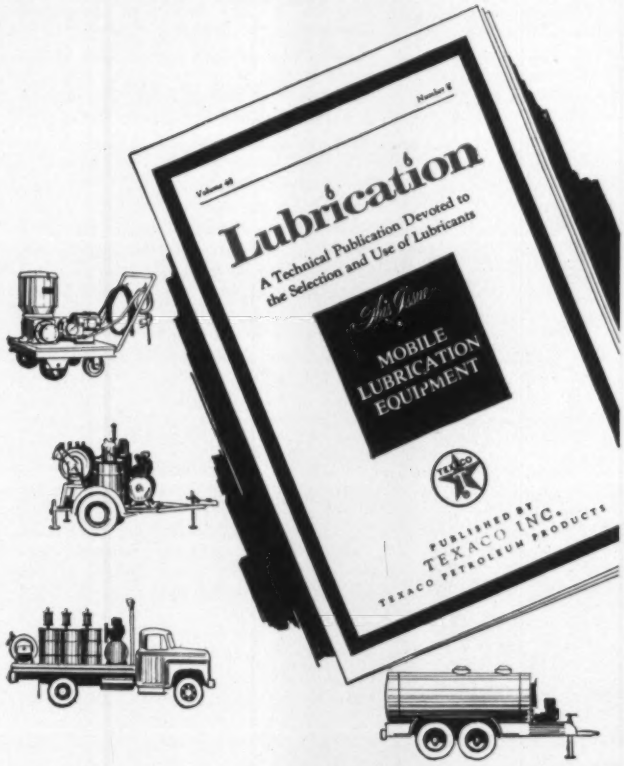


Spark plug tip: Degrease before you blast

Don't depend on your spark plug cleaner to do everything. As a matter of fact, you can actually make things worse by blasting an oil-fouled plug. Heavy oil deposits on the plug will pick up the abrasive and hold it in the recesses between the shell and the insulator. Result: burning and ultimate failure because these deposits can seriously affect the spark plug's ability to dissipate heat at high engine speeds.

Moral: degrease oil plugs in a suitable solvent and dry them *before* you blast.

prolong equipment service life

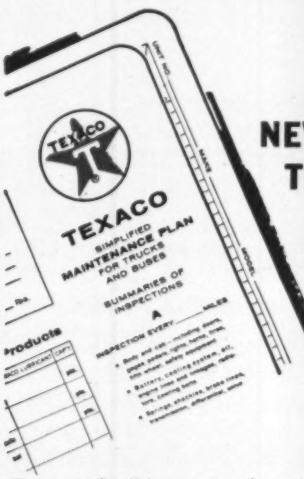

Lubrication
A Technical Publication Devoted to the Selection and Use of Lubricants
MOBILE LUBRICATION EQUIPMENT
PUBLISHED BY TEXACO INC. TEXACO PETROLEUM PRODUCTS

The whole truth about mobile LUBE RIGS

- What good lube rigs are made of—the products and the dispensing equipment.
- How to use lube records to make your rig more valuable.
- Special purpose lube rigs.
- Pros and cons of mobile and centralized lubrication.

What does it take to make a mobile lube rig? What do you put on it? How do you use it? The questions have been coming in so fast lately that Texaco has devoted a whole issue of its magazine, *Lubrication,* to answering them: the March 1960 issue, titled "Mobile Lubrication Equipment."

Lubrication is a major factor in cost control, and lube rigs can be a major factor in thorough maintenance, so send for your free copy of the March *Lubrication.* Supply of these valuable booklets is limited, so if you want one, send in your request *now* to Texaco Inc., 135 East 42nd Street, New York 17, N.Y., Dept. NR-12.



NEW TRUCK RECORD FOLDER fits itself into your schedule

Texaco's flexible new truck record folder lets you stick to the lube schedule that works best for you without running into bookkeeping problems. Lubrication and oil schedules are completely separate from mechanical maintenance and replacement parts schedule—you don't have to follow any pre-established routine to use the folder profitably. And this new folder accounts for every single dollar you spend on truck maintenance for a whole year. Get yours now.

Tune In: Texaco Huntley-Brinkley Report, Mon. Through Fri.-NBC-TV

TEXACO LUBRICATION ENGINEERS

Every now and then we'll bring you a batch of "sleepers," little angles, so easy to overlook, where big savings in money and time can be made. If Lube Logic doesn't solve your problems, call your local Texaco man. Anytime, all the time, he's your best source of money-saving lubrication ideas. Don't forget that "Lubrication is a major factor in cost control." Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

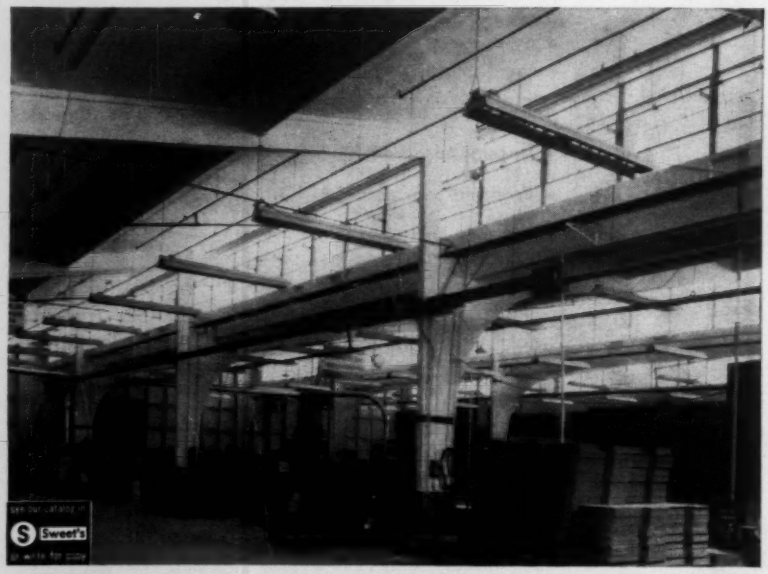
TEXACO

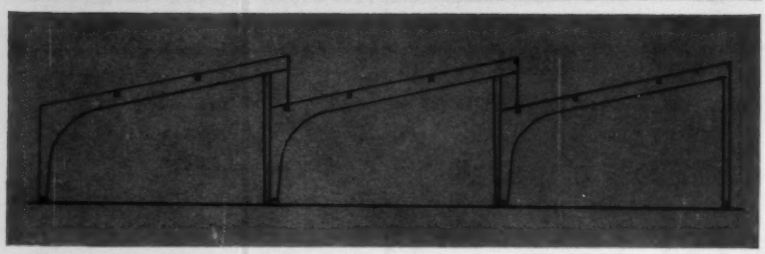
Throughout the United States

Canada • Latin America • West Africa

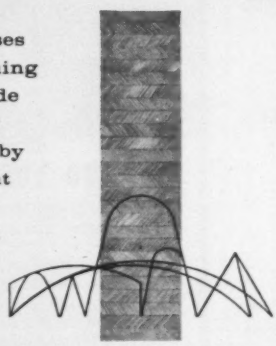
Container plant of International Paper Company, Pinedale, California. Engineer: David R. Edwards, Maywood, California. Contractor: E. A. Hathaway, Inc., San Jose, California.

Space provided: 25,000 square feet for manufacturing, warehousing and shipping; 3,000 square feet of office space. *Structural framing:* Tudor half-span arches used as rigid frames; glulam purlins. Arches are spaced at 40'. *Exterior walls:* exterior grade plywood and battens for main building; Texture One-Eleven plywood for office wing. *Interior walls:* painted plywood. *Floor:* vinyl tile in office areas; hardened concrete in plant sections. *Roof:* built-up felt over plywood skin. *Heating and air conditioning:* forced air for both cooling and heating. *Lighting:* fluorescent fixtures in both offices and plant. *Area:* 28,000 square feet. *Cost of roof framing:* including arch bents, glulam purlins and beams, sawn columns and end wall bracing, $0.868 a square foot erected in place.





Typical of imaginative yet practical uses of engineered timber structural framing are these Tudor arches which provide a sawtooth roof contour for clerestory lighting. They were manufactured by Timber Structures, Inc. under constant quality control which assures their permanence and excellent performance on the job.



TIMBER STRUCTURES, INC.
P. O. Box 3782-C, Portland 8, Oregon

DIVISION OFFICES IN RAMSEY, N.J.; SCHILLER PARK, ILLINOIS; DALLAS, TEXAS

District Representatives in Major Cities throughout the United States • Member A. I. T. C. and Producers' Council

Reader Comment

CPM—Good but No Magic

SIR—The Critical Path Method (ENR Jan. 26, p. 25) has some excellent possibilities.

But the problem with a new technique is that someone decides "this is the answer to our prayers"; they give it a "fast whirl"; it doesn't work for them, so they discard it.

If the "old timer" does not seem to be overly enthused by it, it is only because he has been doing these same things—going through these same calculations and relationships of the various aspects of his work in the preparation of his bar graph—but the figuring and calculations on his "back-up" sheets do not show on his bar graph. More than that: He recognizes that to prepare a detailed schedule is fine—but he also recognizes it requires constant adjusting—as will the Critical Path Diagram.

I agree that the Critical Path Method is an excellent technique. I don't think you have pointed out its full value. It can be used to show the manpower built upon a job. It can be used to prepare a cash flow diagram, which is especially important to the company controller. If the estimate is broken down properly, it can make cost checks more accurate; from it can be evolved a single report of interest to management in which the relationships and projection of all that is important to a project can be brought together in one composite report for management.

But don't think all this can be accomplished by waving a magic word labeled "Critical Path Method." The same hard work that has always been done in successful construction companies is still required, but maybe the marginal work involved in this new technique may give you what you need to realize a little higher margin of profit.

W. F. NUMRICH
Chief Engineer
The Schurman Construction Co.
Huntington, W. Va.

VA's Spot on the Frontier

SIR—I was surprised and, of course, complimented to find my name listed among other federal executives in your table of who's who in the Kennedy Administration (ENR Feb. 23, p. 21). However, I am sorry that the accom-

Engineering News-Record welcomes expression of opinions from its readers. Comment should be as brief as possible and pertinent to subjects of current construction importance. Letters should be addressed Editor, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

The $14,000,000 Grand Forks Air Foree Base at Grand Forks, N.D., was a mighty job . . . but not too large for Ætna Casualty to accommodate the bonding needs of the contractor.

When you choose a bonding company, make your choice on these qualities:

SERVICE: Ætna Casualty's offices in more than 70 principal cities coast-to-coast—plus thousands of experienced agents—assure you of quick and efficient service.

EXPERIENCE: Ætna Casualty's experts are carefully trained and thoroughly skilled. Their participation in many types of jobs gives them the knowledge to handle your bonding needs for every kind or size of operation.

CAPACITY: Ætna Casualty is able to handle the largest projects. Its qualifying limit as set by the Federal Government is in the highest group.

Choose your bonding company on these qualities and you'll choose

ÆTNA CASUALTY

Quality BONDING Service for contractors in every field.

Ætna Casualty and Surety Company • Hartford 15, Conn. • Affiliated with Ætna Life Insurance Company • Standard Fire Insurance Company

TUNNEL	LOCATION	LENGTH IN FT.	BORE
Bingham Tunnel #5490	Utah	17,951	20′ x 25′
Flaming Gorge Tunnels	Utah	1,100	20′ x 25′
Salt Lake By-pass	Utah	8,000	8′ x 8′
Columbia Tunnel	Utah	8,500	7′ x 14′
79th St. Chicago Tunnel	Illinois	24,400	19′
Washington, D.C. Tunnel	District of Columbia	6,800	17′
Eucumbene-Tumut	Australia	36,916	24′
Diversion Tunnel	Australia	3,538	18′ x 20′
Murrumbidgee-Eucumbene	Australia	53,800	11.3′
Cumbaya Hydro-Electric Project	Ecuador	27,800	12′
Tooma-Tumut	Australia	49,520	12.5′
Hanabanilla Tunnel	Cuba	22,000	14.1′
Glen Canyon—Diversion	Arizona	2,900	46′
Access	Arizona	12,000	23′
Spillway	Arizona	2,200	50′
Cable Control	Arizona	1,300	7′
Fremont Canyon	Wyoming	22,000	19′
Vasquez Tunnel	Colorado	16,000	7′
Quandary Tunnel	Colorado	6,000	6′ x 8′
McCullough Tunnel	Colorado	6,500	6′ x 8′
Rampart Range Tunnel	Colorado	4,200	8′ x 9′
Silver Falls Hydro-Electric Project	Ontario	10,400	17′
SAGE Tunnels	Ontario	7,000	10′ x 10′
Quebec Cartier Railway	Quebec	5,000	18′ x 22′
Montreal Sewer Tunnels	Quebec	15,000	9′
Bridge River Hydro-Electric Project	British Columbia	13,000	18′
Cooper Lake Hydro-Electric Project	Alaska	4,600	12′
Blue Lake Hydro-Electric Project	Alaska	9,000	12′
Vancouver PO Project	British Columbia	2,200	8′
Navajo Dam	New Mexico	3,200	18′6″

On these 81 tunnels... the rock

B&O Railway	West Virginia	581	25′
Foothills Parkway Vehicular	North Carolina	840	32′
Smith Dam Diversion	Alabama	1,946	26′
Flannagan Diversion	West Virginia	780	21′
Blue Ridge Vehicular	North Carolina	900	32′
Canyon-Ferry Tunnel	Montana	12,000	7′
Luray Vehicular	Virginia	1,000	32′
Kettle Creek Diversion	Pennsylvania	900	19′
Allegheny Sewer Authority	Pennsylvania	5,500 52,000	8′ 8′ to 14′

Total length of tunnels: 1,112,735 FEET

Period covered: Tunnels completed or in progress during the past five years ONLY.

TUNNEL	LOCATION	LENGTH IN FT.	BORE
Noonsack Tunnel	Washington	8,800	7′ x 8′
Avamate Water Tunnel	Ohio	3,000	14′
West Delaware Aqueduct	New York	227,040	14′
Newtown Creek Tunnel	New York	8,045	11′6″
Worcester Diversion Tunnel	Massachusetts	4,800	19′
Western Pacific Tunnels #4 & 5	California	12,800	22′ x 28′
Clear Creek Tunnel	California	57,030	17′6″
Lafayette Tunnel	California	15,840	9′6″
Cherry Valley Power Tunnel	California	29,400	12′6″
Eleanor-Cherry Tunnel	California	6,400	11′
Mammoth Pool Tunnel	California	42,240	21′
Haas Tunnel	California	32,800	13′
Jaybird Tunnel	California	23,300	15′
Camino Tunnel	California	27,220	13½′
Western Pacific Railway #2 & 3	California	5,600	22′ x 28′
Mammoth Pool Diversion Tunnel	California	1,300	28′
Wishon Diversion Tunnel	California	1,400	15′
Poe Tunnel	California	36,960	19′ x 27′
Trinity Dam Diversion Tunnel	California	2,800	34′
Western Pacific Railway Tunnel	California	3,000	22′ x 28′
Caribou Power Tunnel	California	9,240	12′
Butt Valley Power Tunnel	California	10,560	13′
Dez Dam—Diversion Tunnel	Iran	2,160	50′
Access Tunnel	Iran	10,820	21′ x 18′
Glendale Tunnel	California	18,000	17′
Green Springs Tunnel	Washington	2,100	6′
Cascade Tunnel	Washington	4,800	6′
Pacific Power & Light—Diversion Tunnel	Washington	3,000	32′
Power Tunnel	Washington	1,575	25′
Penstock Tunnels	Washington	1,950	13′

drills are all Gardner-Denver

Faroday Tunnel	Washington	2,463	23′
Pelton Dam Tunnel	Washington	600	20′
Coregan Dam—Diversion	Washington	1,800	18′
Outlet & Penstock	Washington	2,070	15′
Hills Creek Dam Tunnels	Washington	1,600	18′ x 10′
Main Relief Sewer Philadelphia	Pennsylvania	4,200	16′
Bull Run Dam	Oregon	1,200 1,000	9′ 18′
Chicago Water Tunnel	Illinois	2,250 1,400	16′ stub 20′ stub
Costile Falls Tunnel	Washington	900	12′

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Ill.—Offices in principal U.S., Canadian and Mexican Cities.
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario.

International: Gardner-Denver International Division, 233 Broadway, New York 7, N. Y.
Offices: Buenos Aires, Argentina; Artarmon, N.S.W. Australia; Brussels, Belgium; Rio de Janeiro, Brazil; Santiago, Chile; Barranquilla, Colombia; Lima, Peru; Ndola, N. Rhodesia; Salisbury, S. Rhodesia; Johannesburg, Transvaal

you can't

PATCH IT!

Some things can't be patched, let's face it. Among them are a bond issue and a sewer line. If either fails, you start all over again—and that's expensive.

If your city puts inferior sewer pipe in the ground—and gases and acids ruin it—somebody's got to dig it up and replace it. That costs you—the taxpayer—a whole lot more money than putting down lifetime pipe in the first place.

Putting in an inferior sewer pipe is a real penny-wise, pound-foolish idea, anyway. The big cost of putting in a sewer line is tearing up streets and digging the ditch, NOT the pipe. Actually the pipe—the best, lifetime pipe—averages about only 12 percent of the cost of the job.

Lifetime pipe is Vitrified Clay Pipe. It can save you untold tax dollars in the long run.

No, you can't patch a sewer line any more than you can a bond issue. But you can patch a hole in your money pocket—and the time to patch it is before you've lost a lot of money. That means demanding lifetime pipe—Vitrified Clay Pipe—for the next sewer line in your community.

Public health is important. Your city may need to upgrade its sewer lines.

Find out how by writing to:

NATIONAL CLAY PIPE MANUFACTURERS, INC.
1028 Connecticut Ave., Washington, D. C.

Please send me full details on the new factory-made compression joints on Clay Pipe.

(name)

(company)

(street address)

(city and state)

B-4C23 EN

COMPRESSION SEALED, VITRIFIED
CLAY IMPERVIOUS PIPE
THE STANDARD in SANITARY SEWERS

NATIONAL CLAY PIPE MANUFACTURERS, INC.
1028 Connecticut Avenue, N.W.
Washington 6, D. C.

. . . Reader Comment

panying article did not tell what the Veterans Administration is doing to accelerate construction.

In accordance with the Administration policy of getting as much work as possible under way in the shortest possible time, we have gone through our program in order to expedite all projects for which there are now appropriated funds.

Between now and December 31, 1961, we plan to put under construction over $98 million worth of new or replacement hospitals, major modernizations and other building projects. This is an acceleration of over $22 million above the work previously programmed for this period.

WHITNEY ASHBRIDGE
Washington, D. C.

The Last Word

SIR: There still seems to be a persistent error in pop-out pressures of the plastic windows used at the Parke-Davis lab in Holland, Mich., as stated by Mr. Thorn Kuhl of Young and Rubicam, Inc. (ENR Jan. 12, p. 11).

If the windows do pop out at the low pressures of 6 to 7 in. of water, these values are not 0.0875 to 0.131 psi as stated. The correct values are 0.217 to 0.252 psi which convert to 31.2 to 36.3 psf.

RONALD D. SADOW
The Dow Chemical Company
Williamsburg, Va.

For Your Calendar . . .

Southern Municipal and Industrial Waste Conference, Duke University, Durham, N. C., April 6-7. Write: Edward H. Bryan, Duke University, College of Engineering, Durham, N. C.

American Industrial Hygiene Conference, Sheraton-Cadillac Hotel, Detroit, Mich., April 9-13. Write: American Industrial Hygiene Association, 14125 Prevost, Detroit 27, Mich.

National Association of Architectural Metal Manufacturers, annual convention, Plaza Hotel, New York City, April 9-14. Write: William N. Wilson, Executive Secretary, NAAMM, 228 N. LaSalle St., Chicago 1, Ill.

Acerican Society of Civil Engineers, Phoenix convention, Hotel Westward Ho, Phoenix, Ariz., April 10-14. Write: William H. Wisely, Exec. Sec., 33 W. 39th St., New York 18, N. Y.

American Welding Society, annual meeting and welding show, Commodore Hotel and the New York Coliseum, New York City, April 17-21. Write: Arthur L. Phillips, 33 W. 39th St., New York 18, N. Y.

Western Association of State Highway Officials, annual conference, Flamingo Hoel, Las Vegas, Nev., April 23-28. Write: C. S. Elche, Reservations Chairman, State Highway Office Building, Carson City, Nev.

Metals Engineering Conference, Metals Engineering Division of the American Society of Mechanical Engineers, Penn Sheraton Hotel, Pittsburgh, Pa., April 23-25. Write: ASME, 29 W. 39th St., New York 18, N. Y.

16th Purdue Industrial Waste Conference, Purdue Memorial Center, May 2-4. Write: Don E. Bloodgood, Chairman of Conference, Purdue University, School of Civil Engineering, Lafayette, Ind.

WORKHORSE
OZALID'S
NEW PRINTMASTER
900

PRINTMASTER 900
Ht.—70½", Width—84¼", Depth—46½". Newest in Ozalid's family of whiteprinters...all designed to give you the finest reproduction at the lowest possible cost. Whatever your need there's an Ozalid whiteprinter to meet it.

Big volume of engineering prints? Put Ozalid's new Printmaster 900 to work. This new, heavy-duty whiteprinter is a workhorse for capacity, a thoroughbred for quality, a favorite for economy.

Fast! Top speeds up to 75 feet per minute. Versatile... processes any dry diazo material up to 42" wide without sticking. Develops both sides in one pass! Unique... new, sleeveless, scratch-proof developing and simplified control make it top performer in its price class.

Here, in truth, is a new concept in whiteprinting. New ideas, new designs from the leader in the industry that spell new efficiency, reliability, economy in engineering reproduction.

The coupon will bring you the facts on Ozalid's new "900". Facts that may save you thousands yearly. Mail it today.

OZALID®

Division of General Aniline & Film Corporation, Johnson City, New York

REMEMBER, FOR PEAK EFFICIENCY, ALL OZALID WHITEPRINTERS WORK BEST WITH OZALID SENSITIZED MATERIALS

Mr. James A. Travis, Mgr., Marketing
Ozalid, Dept. 221Johnson City, New York

Please send information on New Printmaster 900.

Name_____

Firm_____

Address_____

City_____

Save on construction costs with the new '61 FORD TRUCKS

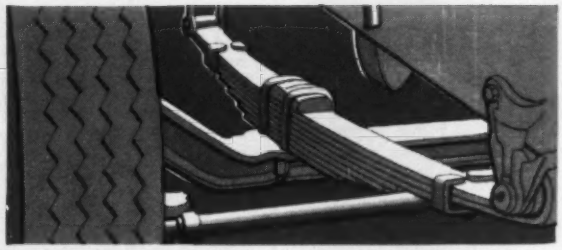
SAVE FROM $31 TO $157 ON PRICE* ALONE WITH FORD'S F-100 STYLESIDE PICKUPS

Contractors everywhere are finding that the half-ton Ford Styleside is priced below all other comparable pickups! And these rugged pickups are designed to keep right on saving with lower maintenance and operating expenses. Their durable, one-piece cab-and-box construction provides increased rigidity and eliminates a major source of rust and corrosion. Not only does the sheet metal last longer with this stronger body, but it also contributes to a quieter ride.

And you can save more . . . because you can carry more on every trip. Styleside bodies are longer and wider with loadspace increased as much as 16%. In addition, wheelbases have been lengthened 4 inches and this combined with the improved shock absorbers gives a ride that's unexcelled in its field—proven by scientific Impact-O-Graph tests. For construction work the angle of approach has been increased so you can climb steeper drives or go over deeper ditches or gullies. Ford also offers America's lowest-priced* 4 x 4 with big 8-ft. box, the F-100 Flareside.

And you can save on operating expense! Ford's Mileage Maker 223 Six is standard on all conventional pickups to keep gas costs low. The economical 292 V-8 is available for jobs requiring extra power. Both engines are equipped with Ford's Full-Flow oil filter that lets you get 4,000 miles between oil changes.

**Based on a comparison of latest available manufacturers' suggested retail delivered prices*



SAVE UP TO $250 ON FRONT TIRES! In certified tests of two-ton truck suspensions, Ford front tires lasted over twice as long. In 40,000 miles this saving can add up to $250 . . . more as the mileage increases. And Ford's sturdy I-Beam front axle and leaf-spring suspension not only cut tire wear, but their simpler design also cuts maintenance costs.

12,000 MILE OR 12 MONTH WARRANTY

SAVE WITH GREATER DURABILITY . . . on all 1961 Ford Trucks, each part, except tires and tubes, is now warranted by your dealer against defects in material and workmanship for 12 months or 12,000 miles, whichever occurs first. The warranty does not apply, of course, to normal maintenance service and to the replacement in normal maintenance of parts such as filters, spark plugs and ignition points. Never before have you had such protection . . . such evidence of long-term economy!

SAVE WITH FORD'S NEW 262-CU. IN. "BIG SIX" ALL-TRUCK ENGINE FOR TOP PERFORMANCE AND ECONOMY

America's savingest two-tonners offer a big 262 Six with the power of big displacement, the gas economy of 6-cylinder design, plus the durability of heavy-duty construction. This engine features a sturdy stress-relieved block, strong forged steel crankshaft, long-lasting stellite-faced intake and exhaust valves, and durable pyramid-type connecting rods. And Positive Crankcase Ventilation reduces oil dilution and sludge formation to extend engine life. Ford's proven 292 V-8 and 292 HD V-8—the V-8's with "six-like" economy—are also available for your special power needs.

You also save with other new durability features like the more rugged frame, stronger radiator with new lock-seam construction, improved cab and chassis electrical wiring, plus longer, easier-riding and more durable rear springs. Ford's parallel ladder-type frame with standard 34-inch width allows you to install new or transfer your present special construction bodies quicker and for less. Also, the frame drop in the cab area lowers cab height . . . makes for easier entry.

NEWS OF MORE SAVINGS FOR HEAVY CONSTRUCTION WORK . . . ▶

Save on construction costs with the new '61 FORD TRUCKS

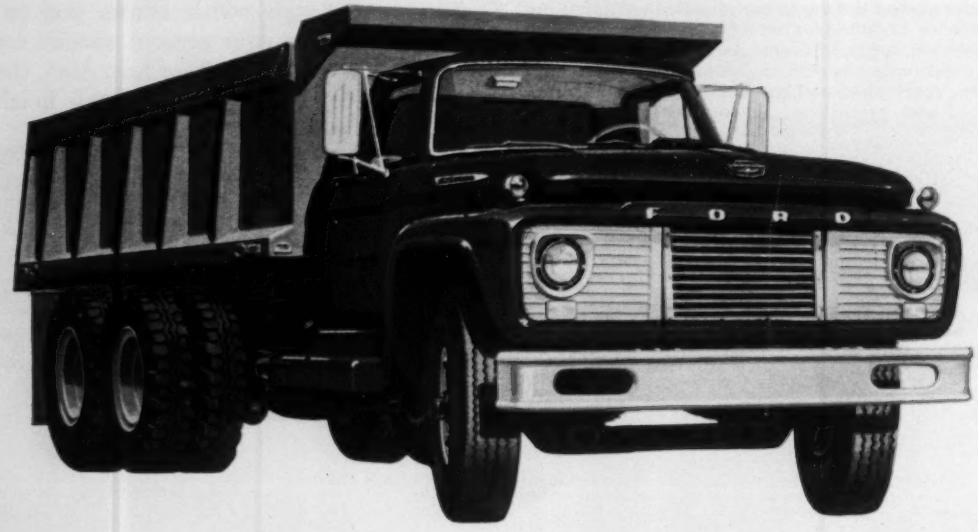
FORD HEAVIES SAVE WITH DOUBLE THE CAB, SHEET METAL AND RADIATOR LIFE

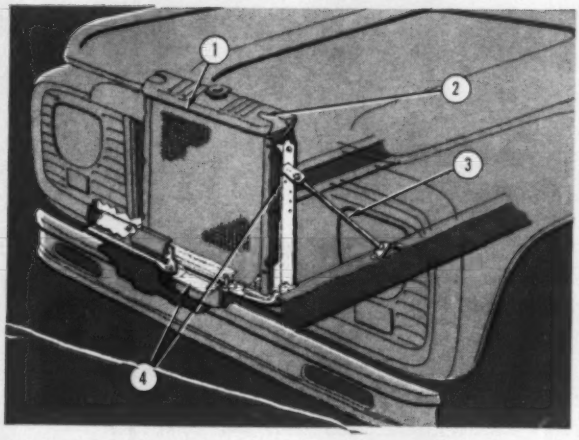
Ford F-Series Heavy Duty models are especially designed for the rugged terrain and tough conditions generally found on construction jobs. Their new independent mounting system for cab and radiator effectively separates both from adjacent sheet metal assemblies for much greater durability. And radius rod-leaf type rear springs provide better axle alignment, a smoother ride and longer spring life.

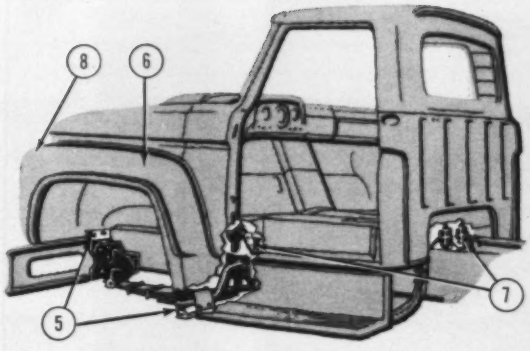
The electrical wiring system has been improved for greater reliability. Chassis wiring is fastened within the protection of the frame web, away from mud, ice and snow. And Ford Truck frames have been engineered to make the mounting of bodies and special equipment easier. A new 212-inch wheelbase model is available to accommodate extra-long bodies.

Save with Ford T-Series Heavy Duty Tandems for exceptional durability, big payloads and low operating expenses. Ford T-700, T-750 and T-800 Tandems have rugged double-channel frames that are built to take tortuous off-road treatment. And they provide a wider range of chassis options so you can choose the right power train and load-carrying components for any job. Eaton and Timken rear axles are now available in bogie assemblies with 22,000-, 28,000-, 30,000- and 34,000-lb. capacities. And lightweight aluminum walking beams, wheels and gas tanks are available to keep chassis weights low . . . payloads high.

Ask your Ford Dealer about Ford's full tandem line . . . including Super Duties with 38,000-lb. bogies for up to 51,000-lb. GVW!







① **Save with Ford's exclusive "lock-seam" radiator construction** that doubles the solder area at key seams for greatly increased strength and longer radiator life.

② **Save with heavier-gauge metal on radiator tank and header.** Tanks and header have thicker walls to resist vibration, jolts and corrosion for greater reliability.

③ **Save with independent radiator mountings,** separate from front-end sheet metal. This means that road shocks and shakes are not transmitted to the radiator through sheet metal . . . tanks, tubes and connections last longer, require less maintenance.

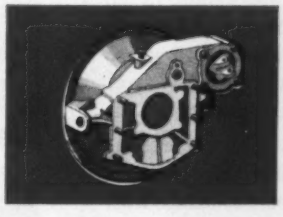
④ **Save with "horse collar" mounting** for extended radiator life. This new mounting on resilient rubber at the center of frame cross member soaks up any frame flexing . . . cuts wear and tear on entire cooling system.

⑤ **Save with independent fender mountings.** Fenders are bolted to a rubber-cushioned transverse bracket at the front and a frame-mounted bracket at the rear. This mounting, independent of both cab and radiator, eliminates stress transfers for increased fender life.

⑥ **Save with removable fenders.** The quick and easy removal of only 8 bolts per fender provides faster service accessibility to the engine area, saving valuable maintenance time.

⑦ **Save with new 3-point cab mounting system** for greater cab durability. Two outboard front mounts plus a centered "twin" rear mount provide a triangular system that holds the cab stationary while allowing the frame to move independently . . . reducing strain on the cab.

⑧ **Save with 25% heavier-gauge sheet metal** in fenders, cab floor pan and toeboard for longer life through more strength and greater resistance to corrosion.



Save with Ford's new Full-Torque flywheel power take-off . . . now available on T-750's and up, to power construction equipment like transit mixers. It's much simpler and more efficient than long, complicated hookups needed with the front-end drives. And the flywheel PTO is lighter in weight—only 105 pounds—for greater payloads.

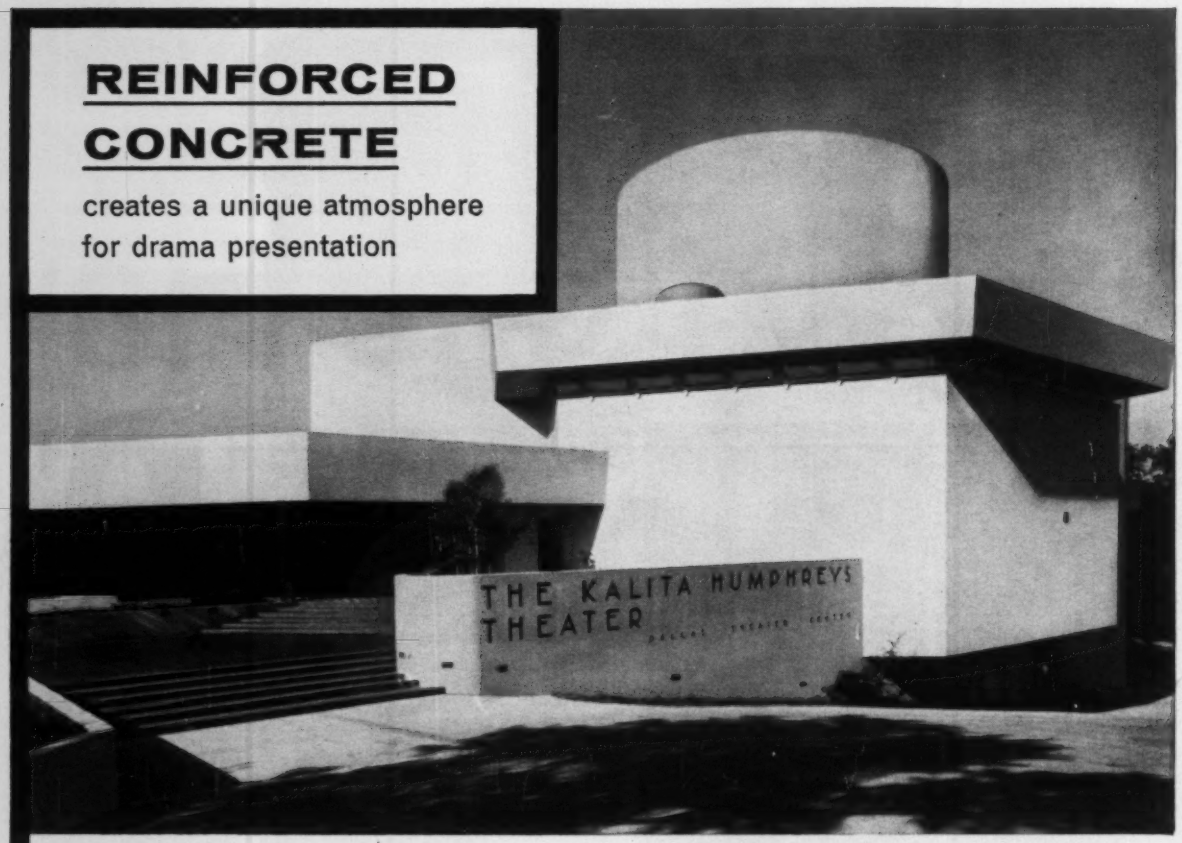
FORD TRUCKS COST LESS

YOUR FORD DEALER'S "CERTIFIED ECONOMY BOOK" PROVES IT FOR SURE...

FORD DIVISION, *Ford Motor Company*

REINFORCED CONCRETE

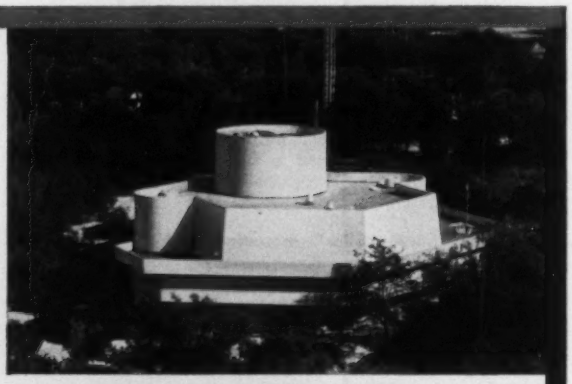
creates a unique atmosphere for drama presentation

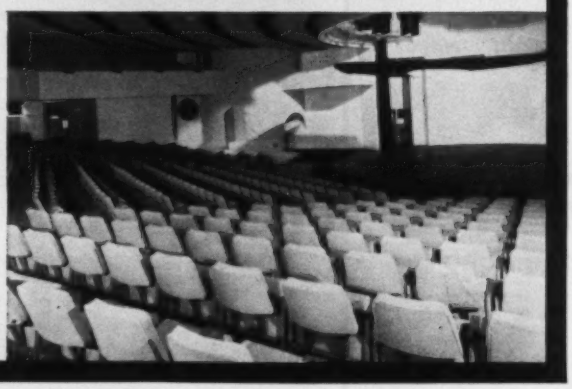


The Kalita Humphrey's Theater, Dallas Theater Center, Dallas, Texas
Architect and Engineer: Frank Lloyd Wright
Resident Architect: W. Kelly Oliver, Dallas
Contractor: Henry C. Beck Construction Company, Dallas

The plasticity of reinforced concrete was utilized to its fullest in achieving this unusual theater design. From the various levels of rock on which the building is situated to the huge circular reinforced concrete stage loft, the building is a study in cantilever construction. In the interior, there are no right angles. Sloping walls and offset angles keep the audience attention focused on the 40-ft revolving stage. Created by Frank Lloyd Wright, it has been called an "incredible combination of intimacy and spaciousness."

Today, in every type of construction, reinforced concrete is enabling architects and engineers to design with greater freedom. On your next project, be sure to investigate the many advantages of this highly flexible construction material.





Concrete Reinforcing Steel Institute
38 South Dearborn Street
Chicago 3, Illinois

4-61

ENGINEERING NEWS-RECORD

Vol. 166, No. 11 March 16, 1961

Number of copies printed in this issue 87,152

CONTENTS

ARBA Endorses JFK's Road Plan..... 21
Rail Engineers Recite Their Woes..... 22
The Heaviest Wood Girder on Record..... 23
Egyptian Joint Venture to Build Aswan..... 23
Engineers Study Yukon Damsite..... 24
Houston Utility Gets 33-Story Headquarters.... 24
Trade Center Plans Firm Up—Cost Up..... 25
No U. S. Aid for Airport Buildings..... 25
JFK's Housing Message: Look to the City..... 26

FEATURES

Profile of the HHFA..... 31
Iran's Two Big Dams Promise a Better Life..... 38
Wide Top Cut Features Slab Joints..... 49
Cranes Team to Lift Heavy Panels..... 52

NEW PRODUCTS

Trencher Uses Vertical Boom..... 55
Sprayer Mixes, Applies Laminates..... 55
Ceramic Tiles Now Mass-Produced..... 58
One Man Operates Power Wrench..... 58

BUSINESS AND FINANCE

Congress Probes Hayes Default..... 75

LABOR

JFK Orders: 'No Discrimination'..... 79

Reader Comment ... 6 Unit Prices 64
Calendar ..... 10 Materials Prices 65
Washington Observer 19 Construction Reports. 68
Obituaries ..... 63 Statistics, Indexes .. 74
Editorials 92

Picture Credits

21—Central Studio; 23—Photo-Art Commercial Studios; 24—U. S. Army Corps of Engineers; 31, 49—UPI; 32, center—Del Ankers Photographers; 33 left—Roger L. Brigham; 33 center—Harris and Ewing; 33 right—Joe Di Paola, Jr.; 52—Harry Low; 58 top—Acker Photo Service.

Back issues of ENGINEERING NEWS-RECORD *are generally available for the previous six months. Semiannual indexes will be sent on request.* ENGINEERING NEWS-RECORD *is also indexed in the Applied Science & Technology Index, Business Periodicals Index and the Engineering Index.*

THE CONSTRUCTION WEEK

SOMETHING NEW—One of the best kept secrets in the construction equipment field will be out tomorrow when Gardner-Denver Co. holds simultaneous showings in nine major U.S. cities of its new "Rota Screw," a machine that compresses air by means of two rapidly rotating screws. The machine will be made in the 125-, 600-, and 900-cfm classes. (For a full description, see ENR next week.)

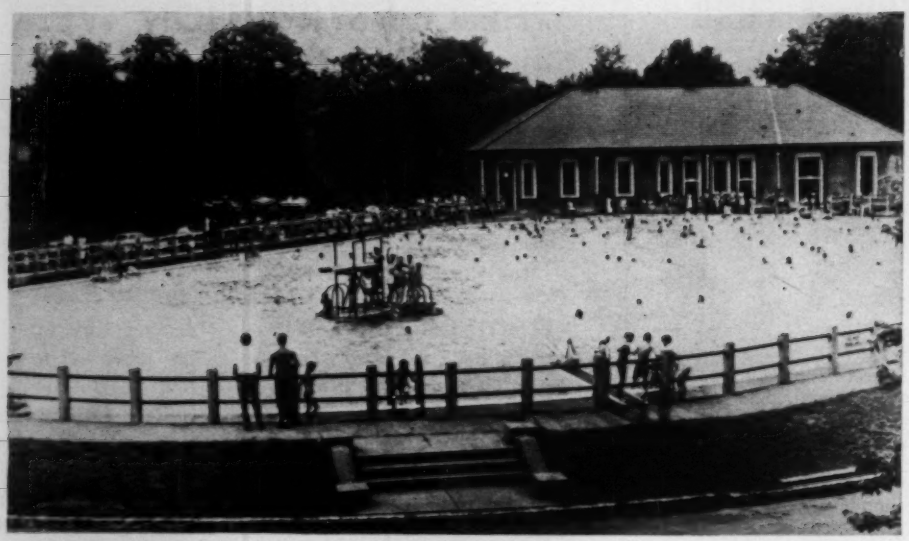
ITSCHNER TO RETIRE—Lt. General Emerson C. Itschner, Chief of Engineers, has requested retirement from the Army as of the end of this month. His successor will probably come from among the 11 major generals now on active duty with the Corps of Engineers. Although it's too early for anything more than guesses, these generals are sure to be among those considered: Walter K. Wilson, Jr., Keith R. Barney, Thomas A. Lane and G. E. Galloway. General Itschner is expected to accept a post in private engineering management.

HHFA AIDE PICKED—President Kennedy this week chose Jack T. Conway as deputy administrator of the Housing and Home Finance Agency. Mr. Conway is now administrative assistant to Walter Reuther of the United Auto Workers Union and director of the National Housing Conference. He is also a trustee of the Citizens Redevelopment Corp., a private group that works with the Detroit city government. (For a profile of HHFA, see p. 31.)

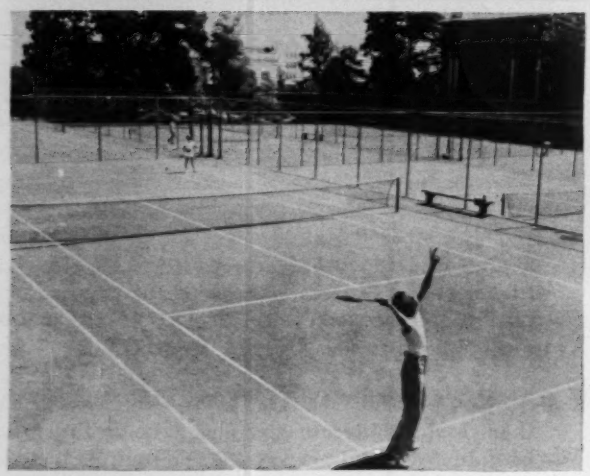
HOLING THROUGH AT OAHE—Tunnelers holed through the thirteenth and final bore at the Army Engineers' Oahe Dam on the Missouri last week. It is a 29.6-ft-dia power tunnel, last of seven that size. Six others are for flood control. The job rounds out eight miles of large-diameter tunneling through South Dakota's Pierre shale at Oahe.

IDLEWILD WINS ASCE AWARD—New York International Airport (Idlewild) last week won the American Society of Civil Engineers' 1961 award as the outstanding civil engineering achievement of the year. The 4,900-acre airport includes 10 terminals serving 38 airlines. Some $288 million has been spent so far to bring it to 75% of completion. The project was started 20 years ago.

BURYING THE PAST—The Florida State Road Board, which suspended Cone Brothers Contracting Co., Tampa, last year for spreading payola among department employees (ENR Dec. 15, 1960, p. 25), reinstated the company last week. Board engineers could find no evidence of sub-standard work on Cone-built highways. Two other Tampa contractors, J. W. Conner & Son and W. L. Cobb Construction Co., had their suspensions reduced to 60 days.



ASPHALT SWIMMING POOLS provide large swimming areas at low cost. Their excellent weathering qualities are based on asphalt's resistance to pressure, freeze-thaw, chlorine, and abrasion. Asphalt wading pools serve equally well as skating rinks.



ALL-SEASON TENNIS COURTS paved with asphalt are fast, true, unaffected by frost, and can be played on immediately after rain.

RESILIENT PLAYGROUND PAVING of asphalt answers the need for a smooth, hard surface which can be used year-round in all kinds of weather. Fewer injuries occur on asphalt than on untreated earth or loose aggregates. Maintenance is negligible.

ASPHALT FROM ESSO
OPENS THE WAY TO LOW-COST RECREATION

Asphalt from Esso gives motorists a smooth, comfortable ride on many of the nation's best roads. It also plays a big part in meeting the growing need for recreational facilities. In both fields, asphalt is saving money for taxpayers.

Esso refines asphalt in a wide range of grades to suit a variety of recreational and other purposes; delivers it from nine conveniently located supply points so you can always get prompt deliveries. For technical information about this economical and versatile material, write us at 15 West 51st Street, New York 19, New York.

ESSO STANDARD, DIVISION OF
HUMBLE OIL & REFINING COMPANY

WASHINGTON OBSERVER

- **Compromise likely on road financing**
- **Tighter rules on right-of-way coming**
- **School-aid program in trouble**

● **President Kennedy faces a difficult time in getting Congress to adopt his financing formula to insure completion of the Interstate highway program on schedule.** Some of the most powerful lobbies in Washington were operating against him this week at hearings before the House Ways and Means Committee.

The batile is not over the need for extra money, but who should provide it. Strong pressure is being brought against various facets of the Kennedy proposal by truckers, petroleum interests, tire dealers, the American Automobile Association and even some farm groups. This is exerted not only in Washington but also from the grass roots.

The alternatives to heavier taxation do not command strong support. These include cutting back or stretching out the program, resorting to deficit financing or issuing federal highway bonds. There also is considerable hesitation, both in Congress and the White House, to raising the gasoline tax to 4½ cents a gallon at this time.

A compromise is the likely result. It probably will take these general lines: Keep the gas tax at four cents a gallon, grant at least part of the gross-weight tax hike on trucks, reduce or eliminate other proposed increases and make a limited diversion from general treasury funds to make up the difference.

—

● **A tightening of disposition procedures for buildings removed from Interstate highway right-of-way is almost certain to result from the latest Blatnik subcommittee hearings.** The group found that Florida lost hundreds of thousands of dollars from such sales by letting contractors take over disposition of the buildings.

Rep. John A. Blatnik (D., Minn.) plans to meet soon with Federal Highway Administrator Rex Whitton. He will urge stricter enforcement of a Bureau of Public Roads regulation which says highway construction contracts must not be let until most of the rights-of-way involved have been acquired.

Representative Blatnik also will urge other states to follow the example of Ohio and California. They have set up revolving funds to provide financing for right-of-way purchases far in advance of actual construction. His investigators say the lax practices followed in Florida are prevalent in other states.

—

● **President Kennedy's aid-to-education program is placed in serious jeopardy by the question of aid to parochial schools.** The bill faced rough going in the House anyway. Opposition of Catholic leaders to a grant program that does not include long-term loans to parochial schools worsens the situation considerably.

The federal government already aids parochial schools with loans for science labs and equipment. Another Kennedy proposal would give long-term, low-interest loans to denominational as well as state colleges for housing and classrooms. But Mr. Kennedy insists that aid to elementary and secondary church schools is quite different, since education at these levels is compulsory.

Mr. Kennedy might veto the bill if Congress attaches a loans-to-parochial schools amendment.

PROTECTION IN DEPTH

How it helps cut compensation costs

Had any accidents down on the floor lately?

Working a deep cut can be dangerous. Noise and congestion team up with other hazards to cause bodily injuries and raise your insurance rates. Liberty Mutual safety engineers are experienced in studying work sites and setting up traffic patterns. They know machines and they know men, and they can help you safeguard both to improve your odds against accidents and losses.

Construction engineering is just one of the many Liberty Mutual services that add up to protection in depth. For example, Liberty also maintains a loss prevention research center, provides employee training aids, helps policyholders set up health programs for their workers. When accidents do happen, specialized medical services are available — two rehabilitation centers, a special paraplegic ward, and diagnostic aid from leading orthopedic specialists all across the country.

Last year, protection in depth helped save Liberty Mutual workmen's compensation policyholders many millions of dollars.

To find out how Liberty's protection in depth can help you save money, too, just call the nearest Liberty Mutual office.

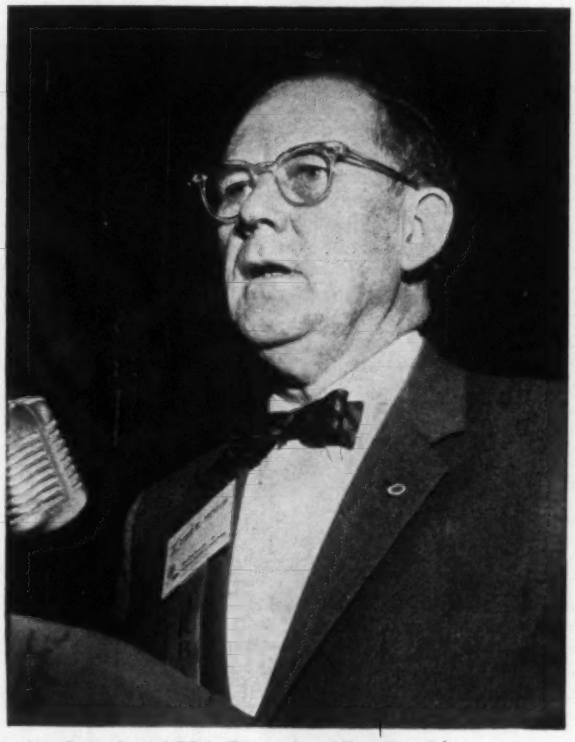
Look for more from

LIBERTY MUTUAL

the company that stands by you

LIBERTY MUTUAL INSURANCE COMPANY • LIBERTY MUTUAL FIRE INSURANCE COMPANY • HOME OFFICE: BOSTON

Personal Insurance: Automobile, Fire, Inland Marine, Burglary, Homeowners • **Business Insurance:** Workmen's Compensation, Liability, Group Accident and Health, Fire, Inland Marine, Fleet, Crime



L. W. Prentiss, ARBA Executive Vice President . . .
"We are pleased with the President's message on highways."

Rex M. Whitton, Federal Highway Administrator . . .
"The Interstate system can and must be completed in 1972."

ARBA Endorses JFK's Road Plan

"Just what the doctor ordered." That was the overwhelming response to President Kennedy's highway message to Congress earlier this month (ENR Mar. 2, p. 22) among speakers and delegates to the 59th annual convention of the American Road Builders Association held in Atlantic City, N. J., last week.

L. W. Prentiss, ARBA's executive vice president, expressed the feeling of the group in this way: "ARBA is pleased with the President's special message to Congress on highways. We believe that the urgency of the program is well stated and that his recommendations to insure its accomplishment are sound."

Asked if the Chief Executive's proposed program would do the job, Mr. Prentiss replied: "Yes, it will permit authorizations to cover the cost of the $37-billion federal share of the Interstate program; it also will finance an ABC program reaching $1 billion a year for fiscal 1968."

Departing from its usual fence-straddling position on highway financing, the association endorsed Mr. Kennedy's proposal to provide for "completion of the Interstate program with no stretchout and no cutback," as well as continuation and expansion of the federal-aid program for ABC roads.

In his maiden speech as Federal Highway Administrator, Rex M. Whitton amplified the Administration's position. "I foresee no drastic changes in the program as we know it," Mr. Whitton said. "Whatever revisions are made are likely to be in the interests of speeding up the program, promoting greater efficiency in it, humanizing certain aspects of it, rather than shifting emphasis or altering its basic goals."

"I believe the National System of Interstate and Defense Highways can and must be completed in 1972," he said.

Mr. Whitton deplored occasional instances of misconduct in the highway program and called for assistance from contractors and suppliers of materials and equipment in eliminating them. "It is your legal and moral responsibility, not only to give full value for every public dollar spent, but to be constantly alert for shady practices," he said. "After all, it takes two to make a conspiracy."

Mr. Whitton also asked for greater effort to bring the highway story to the public.

"There is no question that the state highway departments and the Bureau of Public Roads have made tremendous strides in public information and public relations in recent years," he said. "But," he added, "I think we can and must do better."

Senator A. S. "Mike" Monroney (D., Okla.) chief congressional proponent of federal aid for airports, called for greater investment in highways and airports to provide greater safety. "The cost in human life of traffic accidents—highway and air—is one that this nation can ill afford," he said. "The choice is between dollars and death."

Sen. Monroney proposed a "new concept" of the airport system, based on a joint effort to find new airport locations in uncongested areas, locations that could be served by efficient and fast highway transportation. "Time in

. . . ARBA endorses road-financing plans

traffic, not distance, is the critical factor in airport location," he said.

A highlight of the convention program was a panel discussion, "Industry Talks With Congress," moderated by Bertram D. Tallamy, former Federal Highway Administrator. Senator Francis Case (R., S. D.), Rep. George H. Fallon (D., Md.) and Rep. Gordon Scherer (R., Ohio) answered questions posed by a manufacturer, a contractor and a consulting engineer.

Representatives Fallon and Scherer vigorously defended the highway program and its benefits. Although in general agreement, Senator Case held a somewhat different point of view. "It is impossible to look only at one segment of the national financial picture; consideration must be given to total fiscal condition," he said, citing financial needs in other areas of government. "I am not yet persuaded that Congress will go for either of Mr. Kennedy's financing proposals," he added.

All three agreed that the traditional federal-state relationship in the highway program should remain as is, although Senator Case called for stronger federal influence in assigning priorities to projects built by the states.

Senator Albert S. Gore (D., Tenn.), one of the sponsors of the 1956 Highway Act, took sharp issue with current and proposed methods of highway financing. "We made a big mistake in the 1956 act by creating the Highway Trust Fund . . .," he said. "It has put the Interstate program on a back seat. Its repeal should be a first order of business."

"I, too, am opposed to cutbacks or stretchouts," Senator Gore asserted. "We simply cannot afford a slowdown in highway construction in 1961." Referring to Mr. Kennedy's proposal to extend the one-cent federal tax on gasoline and increase other excise taxes imposed on highway users, Senator Gore said: "His choice was, in my opinion, an unhappy one. Not only are highway users expected to pay in full the cost of highways by special taxes, but other special taxes are levied upon them to provide funds for the general treasury. If we are to follow the questionable principle that highway-user taxes must pay for highways, then we ought at least to use for highways all revenues received from this source before further increasing highway-user taxes."

Mace Bell, chief engineer of the American Institute of Steel Construction, described a "fourth dimension" in the design of steel bridges—the selection of the most efficient steel for each function from among the wide range of steels available. "Among the more important advances in steel bridge design," he said, "are composite design, prestressed steel beams and orthotropic plate construction."

A major handicap to the design of the most efficient and economical steel bridge, according to Mr. Bell, is overly conservative specifications and regulations governing design and fabrication.

A 27-man symposium on equipment described recent improvements in machines and methods, and discussed problems of equipment acceptance by engineers and contractors. Areas covered by manufacturers included earth moving, material processing and paving. Acceptance of equipment was discussed by a manufacturer, two contractors and a state highway engineer.

Major roadblocks preventing acceptance of new machines were held to be restrictive equipment and methods specifications used by some state highway departments, general reluctance on the part of highway engineers to accept new techniques and non-uniformity of specifications and standards among the various states. Additional tax incentives were thought to be necessary to encourage contractors to modernize their equipment fleets and equipment manufacturers to modernize their plants.

Key members of the group urged the establishment of a joint ARBA-AASHO committee on equipment to "seek out and remove roadblocks which are hampering the development and use of improved equipment in the highway program."

Ralph R. Bartelsmeyer, chief highway engineer of the Illinois Division of Highways, was elected president of ARBA. ARBA also elected one new vice president and seven new directors. The new vice president is Boyd S. Oberlink, senior vice president of the Allis-Chalmers Mfg. Co.

Rail Engineers Recite Their Woes

U. S. railroads, faced with increasing competition and continued reduction in earnings, are in serious trouble. That thought was uppermost in the minds of speakers and listeners at the 60th annual meeting of the American Railway Engineering Association in Chicago last week.

The present plight of the railroad industry can be attributed to four factors, according to C. D. Buford, vice president of the Association of American Railroads and keynote speaker of the meeting. They are: technological changes; shifting patterns of commerce; growth of unregulated carriage; and increasing public investment in transportation facilities.

Although governmental assistance is needed to help stop the downward trend in railroad business, Mr. Buford declared, there is much the railroads can do for themselves. This includes improvement of facilities, development of new transportation concepts, and improved methods and tools to reduce both maintenance and operating costs.

Automatic train operation is a challenging area of future development, said Mr. Buford. Possibilities also exist in the integration of truck and container terminal facilities with railroad terminal yards. One possible solution, he said, is to develop special rail cars for transferring bulk commodities to dump trucks, just as containers can now be transferred to flat cars. Additional innovations are needed in equipment for track work and maintenance to reduce labor and cut costs, he said.

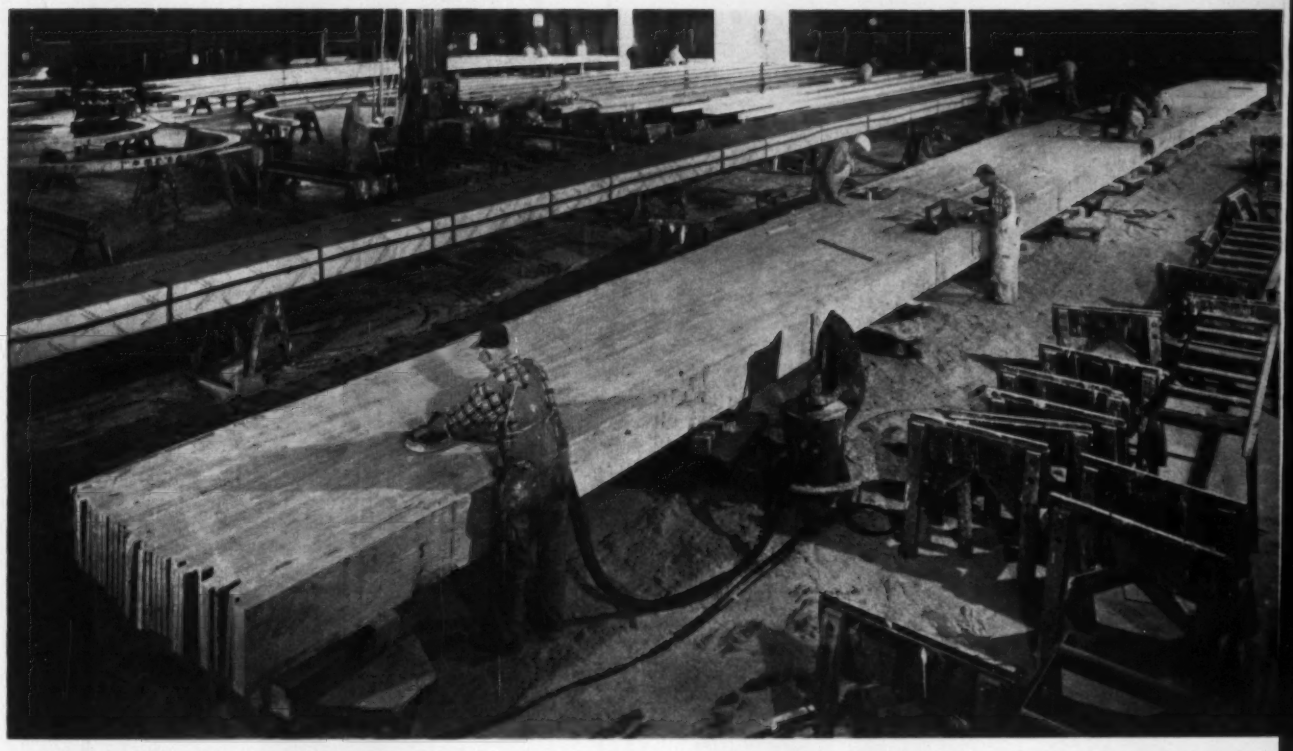
H. C. Murphy, president of the Burlington Lines, said railroads should benefit from the fact that several states are taking steps toward less oppressive property taxation of the railroads. He said Congress is also showing a more active interest in equitable economic regulation of the transportation industry.

A number of significant research projects will be started or carried forward this year by AAR, according to W. M. Keller, vice president for research. They include: detection of defects in axles, rails and wheels by ultrasonic waves; prestressed concrete ties; insulated rail joints; and the use of epoxy resins to repair concrete surfaces. Field tests will be made this year with "piggyback" cars to determine their clearance requirements, he said.

The application of filled epoxy resins in railroad bridge work was described by W. J. Belanger, of Devoe & Reynolds Co., Inc. Some of these resins have ultimate strengths of 5,800 psi in tension, 8,700 psi in flexure and 12,600 psi in compression.

Epoxy resins were used in the erection of two railroad bridges last year. One is a 30-ft single span of four prestressed concrete beam-and-slabs bonded together longitudinally with epoxy grouting inserted in keyways formed in the concrete. The other bridge is similar in design, except that each of its two spans was assembled complete near the site and erected in place with a pair of railroad cranes.

R. H Beeder, chief engineer, Atchison, Topeka and Santa Fe Railway, was elected president of AREA, succeeding E. J. Brown, chief engineer of the Burlington Lines.



Workmen put finishing touches on . . .

The Heaviest Wood Girder on Record

A 20-ton laminated timber girder, believed to be the heaviest wood structural member ever fabricated, will span 114 ft. across a high school gymnasium in Gary, Ind.

The huge wedge-shaped girder tapers from 6-ft depth at the supports to 8½ ft at midspan. It is fabricated from kiln-dried 2x16 planks of Douglas fir, requiring almost 21,000 fbm of lumber. The glued laminations are planed to a 14½-in. width.

The girder was too big for the oversize planing equipment at the Portland, Ore., plant of Timber Structures, Inc., the fabricator, so the 850-sq-ft sides were finished manually.

The giant girder, which in addition to roof framing carries a folding partition, has seven slightly smaller relatives, also spanning 114 ft. Five flat cars were required to ship the giant girders across the continent.

Architects are Wildermuth & Wildermuth of Gary, Ind. General contractor is Superior Construction Co., Inc., of Gary.

With Russian technicians supervising . . .

Egyptian Joint Venture to Build Aswan

A joint venture of two Egyptian construction companies has been awarded the construction contract for the first phase of the High Dam on the Nile River at Aswan (ENR Feb. 23, p. 32) at a figure of $44.2 million.

The Supreme High Dam Committee, made up of government ministers, authorized Dr. Hassan Zaky, president of the High Dam Executive Organization, to sign the contract with the privately owned Osman Ahmed Osman Industrial Engineernig and Contracting Co., Cairo, and the government-owned Misr Concrete Works Co., a subsidiary of the nationalized Misr Bank group.

The only other offer was from a consortium of 11 contracting and engineering firms, which entered a bid of $75.6 million.

The Soviet-Egyptian aid agreement for the construction of the High Dam limited the bidders to only Egyptian and Soviet bloc organizations.

The contract completion date is Dec. 31, 1964. The contractors will use equipment supplied by the Soviets, and work under the supervision of Soviet technicians.

The contract includes:

- Excavation and lining of the open-cut headrace and tailrace sections of the diversion channel, involving the removal of about 12 million cu yd of rock. Estimated cost is $32.5 million and completion date is October, 1963.
- Construction of the upstream cofferdam, 45 meters (148 ft) high and 500 meters long across the Nile River. Volume of material is 10.5 million cu yd, to be placed between December, 1962 and May, 1964.
- Construction of the downstream cofferdam, 37 meters (122 ft) high, requiring the placing of 3.2 million cu yd of material.
- Construction of the cofferdams required for the diversion channel. Cost: about $11.7 million.

The diversion channel cofferdams are temporary, while the upstream and downstream cofferdams will be integral parts of the main dam.

Engineers Study Yukon Damsite

Army Engineers have begun preliminary studies at Alaska's Rampart Canyon—site of a proposed hydroelectric scheme that would rival any now in existence. The hydroelectric potential of the Yukon River site is estimated at around 5 million kw.

A dam would traverse the river in the vicinity of the island in the above photo and impound a reservoir covering about 10,000 sq mi.

Engineers are now at work seeking foundation data—drilling through four to six feet of ice and then to depths as great as 100 ft. With the spring thaw, they plan to move to the side of the canyon and sink test holes.

Other studies are planned on the economic effects of the proposed project as well as the effects that the huge reservoir would have on fish and wildlife in the area.

Houston Utility to Get 33-Story Headquarters

Construction will begin before the middle of this year on a 33-story headquarters office building in Houston for the Tennessee Gas Transmission Co. The square tower, rising without setbacks from a ground level plaza, will contain nearly 1.1 million sq ft of floor space. Completion is scheduled for early 1963.

The structural steel frame will contain no intermediate supports between the central service core and exterior columns. TGT says this office belt between the exterior and service core will be 55 ft wide. Skidmore, Owings & Merrill, San Francisco, are completing working drawings for the structure now. Floors will be concrete fill over cellular steel decking. Mechanical levels will be located midway up the tower and at the top.

Exterior walls will be set in five feet from the face of the structure so that floor slabs at the building perimeter will act as sun shades. The building will be sheathed in anodized aluminum. Glass areas of the curtain wall will be a dark grey, heat-absorbing and glare-reducing glass. Glass specifications and window design are based on the panels withstanding unusually high velocity winds.

A concrete mat foundation up to 8 ft thick will support the structure. Ground floor and basement levels will be of reinforced concrete with the structural steel frame starting at the first level above grade.

Around the Country . . .

• **Search for ideas** – At least 10 awards of $1,000 will be made for ideas that provide improvements, new applications and markets in hot dip galvanizing. The entries—to become public property—will be judged individually as the program continues through April, 1962. The American Hot Dip Galvanizers Association, 5225 Manning Place, NW, Washington 16, D.C., is managing the search with cooperation of the American Zinc Institute.

• **Plan for uniformity**—Construction industry experts on California's State Building Standards Commission have drafted a bill that would give the commission authority to adopt a uniform building code for the state. More than 30 state units can presently write and enforce building standards, and there are nearly 4,700 separate regulations governing building.

• **The decline of walking**—Tacoma has become the first American city to install a moving sidewalk, a 100-ft escalade in the downtown business district that helps pedestrians up a steep hill. It moves at 120 fpm, slower than walking pace, and cost $205,000. Three more are planned.

• **Roads to resources**—Canada's Department of Northern Affairs and Northern Resources will spend more than $4 million this year to build roads to mines and other natural resources in the Yukon Territory.

• **International asphalt**—The University of Michigan, at Ann Arbor, will play host to the International Conference on Structural Design of Asphalt Pavements in August, 1962. The conference will include papers and discussions on design and field performance of pavements, soil conditions, drainage and climatic effect.

• **Pregnant idea**—Shopping centers are feeling the bite of specialization now. In Dallas, the Trel Company will build an air conditioned, mall pattern shopping center, complete with doctors' offices—for expectant mothers. If it lives up to expectations, the company will build more in other cities. The first should be here in about nine months.

• **Expensive delay**—The estimated cost for Lower Manhattan Expressway across the tip of Manhattan was $88 million last autumn. Just after New York's mayor approved construction of the expressway, the cost estimate rose to $100 million.

• **Toll tale** – Kentucky Gov. Bert Combs has broken ground for the start of a 43-mile, $39-million toll-road between Winchester and Campton in Eastern Kentucky. Completion is scheduled for 1963.

Trade Center Plans Firm Up—Cost Up

Revised plans for a World Trade Center in New York City carry an estimated cost figure of $355 million. That's $105 million above the cost set just a year ago when the Downtown-Lower Manhattan Association first made a formal proposal for such a center (ENR Feb. 4, 1960, p. 28).

The Port of New York Authority's revised plan—prepared for the association and submitted to the city and states of New York and New Jersey—calls for an enlarged 16-acre development on Manhattan's lower east side water front. It is one of two areas named by the Downtown Association in 1958 for a $1-billion redevelopment and rehabilitation program (ENR Oct. 23, 1958, p. 77).

The revised trade center plan is dominated by a 72-story World Trade Mart (1), with a circular Stock Exchange building (2), a 20-story Gateway building (3), and 30-story Commerce Exchange (4) grouped around it. All four units would be tied together by a five-level enclosed concourse (5) extending 1,600 ft along the East River.

Altogether, the new proposal contemplates construction of 11 million sq ft of floor space. The $355-million cost is based on starting construction next year and completing the center by 1968.

Port Authority officials say the center would be "feasible" but the dollar return on it would be "marginal"; therefore only a public agency should undertake the development. And the $355-million cost assumes inclusion of some urban renewal assistance. The report maintains that the center is essential if New York City is to have a dominant position in international business and is to handle increasing amounts of cargo in foreign trade. It's on this point that the report put general need of the port ahead of "maximum economic return" from the trade center.

The revised plan includes a hotel of about 350 rooms—vs 500 to 700 rooms in the original proposal—located on the top 11 floors of the 72-story Trade Mart building. The proposed building for the New York Stock Exchange would be an eight-story, 200-ft-dia structure.

A 33-story building at 120 Wall St., that had been included in the original center plan, would be demolished. A heliport (6) on the East River and housing projects (7) would complete the area's development. (Battery Park is indicated at 8).

No U.S. Aid for Airport Buildings

Najeeb Halaby, new chief of the Federal Aviation Agency, feels that federal grants for airport construction should be spent primarily on runways, land purchases and safety features rather than on construction or improvement of terminal buildings.

Mr. Halaby has thus adopted the same general view as his predecessor, Elwood R. Quesada. But he made clear at his first news conference last week that he will be more willing than was General Quesada to allow exceptions to the rule. Exceptions might be made, he indicated, where airports serve not only immediate local communities but also large regional areas.

Mr. Halaby would not say how much the Kennedy Administration will seek from Congress in airport aid for the new fiscal year, which starts July 1. But indications are that an increase will be asked.

President Eisenhower had recommended that a cut be made in the program from the present $63 million to $40 million. He believed that the federal government should gradually end the aid program, which is operated on a 50-50 matching basis.

JFK's Housing Message: Look to

- **Behind Kennedy's housing message lies this assumption: The suburban boom is over for now–it's time to concentrate on the city.**
- **Large construction and design firms may well find themselves back in housing construction in a big way.**
- **The message points to more urban renewal projects, more large public housing developments, and more apartment buildings.**

The Administration has given Congress its proposals for a multi-billion-dollar housing program designed to revive the sluggish homebuilding industry by pumping federal home-loan insurance, loans and grants into a wide variety of special housing programs.

Because of the shifts in housing demand, the new proposals mark a significant change from government policy in times past when the housing market needed new support.

Since the end of the war, the main thrust of new housing legislation has been to lower down payments, lengthen mortgage maturities, and bring increasingly higher priced homes under the FHA insurance programs. By so doing, the government made it possible to tap the backlog of housing demand for houses ranging across the entire price spectrum from less than $10,000 to more than $25,000.

This successive liberalization of credit financed the mushrooming of the suburbs, which in turn was the mainstay of housing starts ever since the end of the war.

However, 1960's 1,260,000 housing starts was a sharp 18% decline from the previous year's 1,531,000, and the outlook for 1961 is not much better.

So President Kennedy and his housing officials want to turn to new markets–provide incentives for rebuilding of city housing through urban renewal programs, new public housing programs, home modernization programs, special incentives for housing for low-income families and particularly for the elderly.

The result is a shift that favors the urban builders and the city planners–and in the construction industry, the design and construction firms that can handle large developments, rental or co-op apartment construction, and other jobs that result from modernization and development of built-up urban areas.

To give more federal coordination and assistance to cities for their own planning, President Kennedy proposes more grants and loans for planning purposes, and new federal aid to help officials set aside open land for parks and other public purposes.

To top this off, he proposes creation of a new Department of Housing and Urban Affairs which will give the urban dweller a voice of his own at the cabinet table (see p. 31).

• **Individual housing**–To help private homebuilders tap the low-income market, Mr. Kennedy proposes to insure no-down-payment, 40-year mortgages on houses costing up to $13,500. He wants such authority to be provided on a "temporary and experimental basis"–perhaps for a year or 18 months. Congress will be inclined to go along with the idea.

Houses in this price range now require a down payment ranging up to $405, and on a 30-year mortgage, payments run about $75 per month. Under the Kennedy plan, payments would run about $70 per month.

Some builders are already praising the idea; others say the $5 difference in monthly payments isn't really big enough to help much–that the problem is finding customers, not financing terms.

• **Co-op and rental housing**–Mr. Kennedy seeks another new program of long-term, low-interest rate loans to provide rental or co-op housing for families who cannot afford housing even with no-down-payment and 40-year mortgages.

He wants Congress to put additional authority into the Fannie Mae special assistance fund to stimulate construction of what becomes, in effect, a substitute for public housing.

A Fannie Mae special assistance fund would be created to provide long-term home loans at interest rates below going markets rates.

The purpose is to offer an incentive to co-ops, labor organizations, churches, local housing authorities and a variety of public institutions or foundations to build and operate housing for families of very low incomes.

• **Public housing**–The President wants Congress to loosen up public housing authorizations dramatically. In recent years, Congress has been approving 35,000 units a year; Mr. Kennedy now suggests that 100,000 units be approved–which is the number still remaining to be authorized under the 1949 basic law.

Mr. Kennedy says that changes in public housing are long overdue. And in order to make public housing more popular–with local officials and perhaps with Congress–the Administration wants much more latitude given to localities for the design and operation of the projects.

In addition, he proposes a program of grants to communities for construction of "demonstration projects" to try to prove to city planners that public housing can be attractive.

Conceivably Mr. Kennedy might get approval for some sort of demonstration program, but Congress is not likely to grant him the 100,000 units he wants.

• **Housing for the elderly**–Some 16 million of our people are 65 or over, and by 1970 more than 20 million will fall into this age bracket. Most of these families have very low incomes–and many need special architectural design to make their homes safe and livable.

As one proposal to provide housing for the elderly, Mr. Kennedy wants to set aside half of the 100,000 public housing units he's asked for. And to take care of the extra cost of building homes specially designed for oldsters' needs, he would raise the permissible cost per room of public housing construction for these tenants by $500, and would increase the monthly federal subsidy per unit by $10.

In addition, he would boost by another $50 million the present direct loan program for private housing for the elderly.

• **Revitalizing metropolitan areas**–As Mr. Kennedy points out, 73 out of 258 central cities lost population during the decade of the '50s as the population moved out to the suburbs. To revitalize the central cities, more planning for commercial, industrial, and residential

the City

revival is needed. Transportation systems—particularly rapid transit—must be improved.

To accomplish this, the President proposes much broader federal participation and financial help for urban planning. Specifically, what's needed, he suggests, is a switch from slum clearance and slum prevention to "positive programs for economic and social regeneration" of metropolitan areas.

In effect, the Administration wants to give more freedom and more authority to the urban renewal concept. Specifically, the message proposes:

• Much greater freedom for urban renewal authorities to designate urban renewal areas. This could mean, for instance, that even a single block could qualify for the urban renewal treatment and the federal subsidies for site clearance and re-sale to a private developer.

• Present urban renewal plans and the new proposals require that federal help be given to communities on a broader basis than project-by-project. The Administration wants to help all the authorities in a metropolitan area to develop plans for the entire complex. The purpose is to give much more affirmative direction to the changing shape and growth of our cities.

Mr. Kennedy proposes to increase federal funds available for urban and metropolitan planning from the present $20 million to $100 million, and he would have Washington bear up to two-thirds of the cost.

• To finance these new urban renewal projects, the Administration proposes that $2.5 billion be authorized over a four-year period to make more funds available for grants, loans, subsidies and revolving funds and to enable plans to be made over longer periods of time.

• To ease one critical problem in pressing urban renewal projects, the Administration would be willing to contribute more to compensate businessmen forced to move out—providing that localities are willing to increase their payments too.

The Administration wants more open space reserved around and in metropolitan areas for parks and recreation—to give better control over zoning, to prevent undue speculation in land, and to give state and regional bodies better control over community development. Mr. Kennedy wants Congress to approve $100 million for a program of grants under which the federal share would be 20% of the cost. But such assistance is contingent upon the creation of comprehensive plans for metropolitan and regional development.

The Message in Brief

Low Price Private Housing

• Provide FHA insurance on no-down-payment, 40-year mortgages (now available only to families displaced by government action) to any low-income family.

Public Housing

• Authorize 100,000 new starts; give local authorities greater freedom in admitting tenants.

• Authorize a "demonstration grant" program to stimulate greater experimentation with different types of public housing.

Housing for the Elderly

• Add another $50 million to present $50-million fund for direct loans for housing for elderly.

• Earmark 50,000 of the 100,000 public housing units for elderly persons; increase cost limitation by $500 per room; increase federal subsidy limit by $10 per month per housing unit.

Urban Renewal

• Give local communities greater freedom in determining renewal areas. Authorize additional $2.5 billion for urban renewal programs for use over a four-year period.

• Raise federal relocation payments to businessmen displaced by projects if localities share in the larger compensations.

Rental and Co-op Housing

• New program of long-term, low interest rate loans for rental and co-op housing; borrowers would be co-ops, non-profit associations, limited dividend corporations, local housing authorities.

Residential Rehabilitation & Conservation

• New authority to FHA to insure home improvement loans.

• Permit resale of existing housing in urban renewal areas at a realistic price for rehabilitation.

Metropolitan Development

• Increase federal funds for metropolitan planning from present $20 million to $100 million.

• Increase federal government's share of the cost to two-thirds.

Land Reserves and Parks

• Provide $100 million for new program of 20% grants to help localities reserve land for parks or other purposes.

• Allow urban renewal loans to be advanced to acquire open space for "future public or private development"; a prerequisite is a comprehensive plan for metropolitan or regional development.

Community Facilities

• Add $150 million for public facility loans.

Veterans Housing

• Extend the duration of the direct loan and loan guarantee programs (now due to expire in 1962).

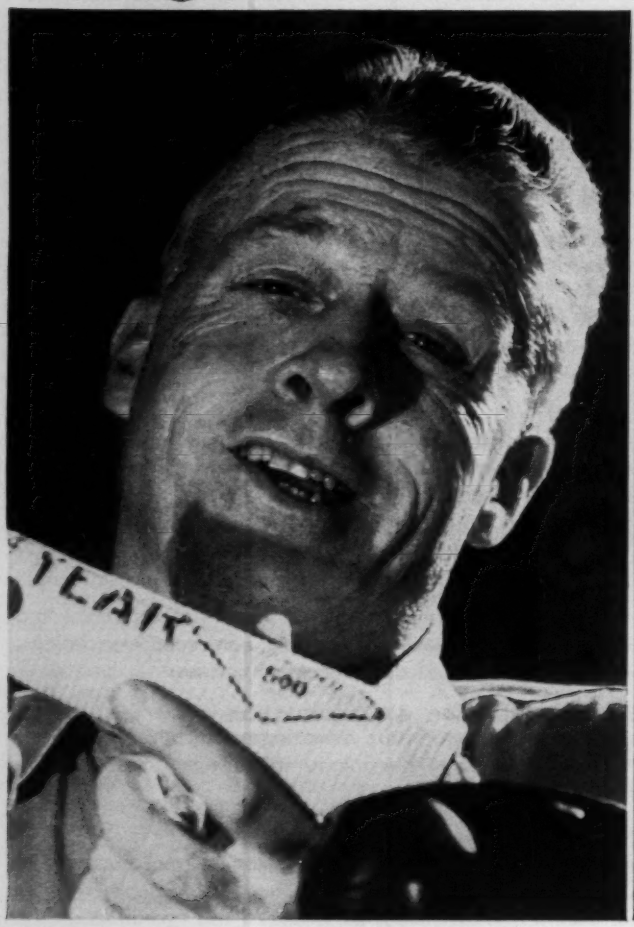
• Expand direct loan authority by an unspecified amount.

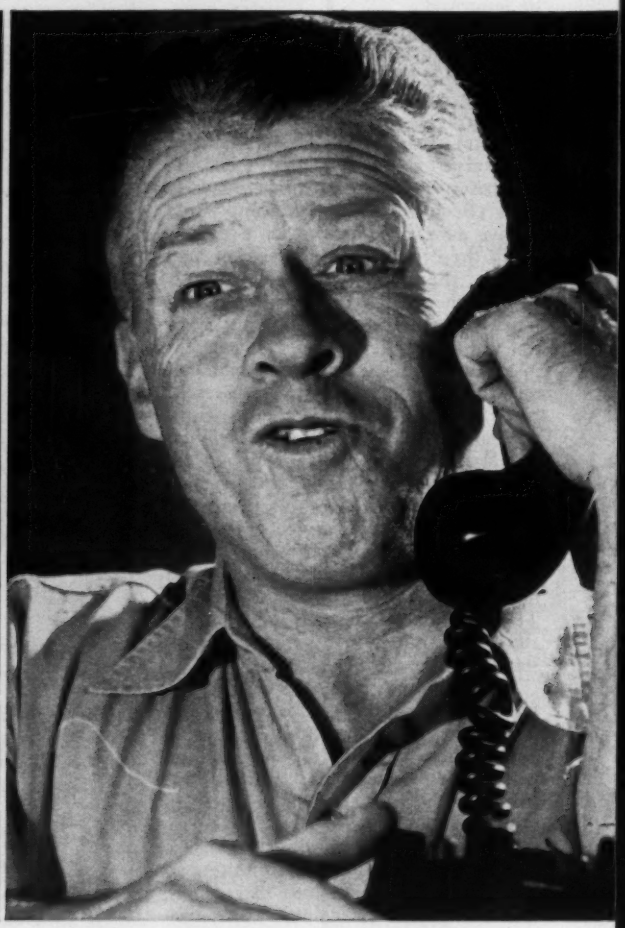
Research

• Create special FHA insurance authority to be used exclusively to help finance tests and demonstrations of new home designs and construction techniques to help cut costs.

GOODYEAR

Why not buy hose





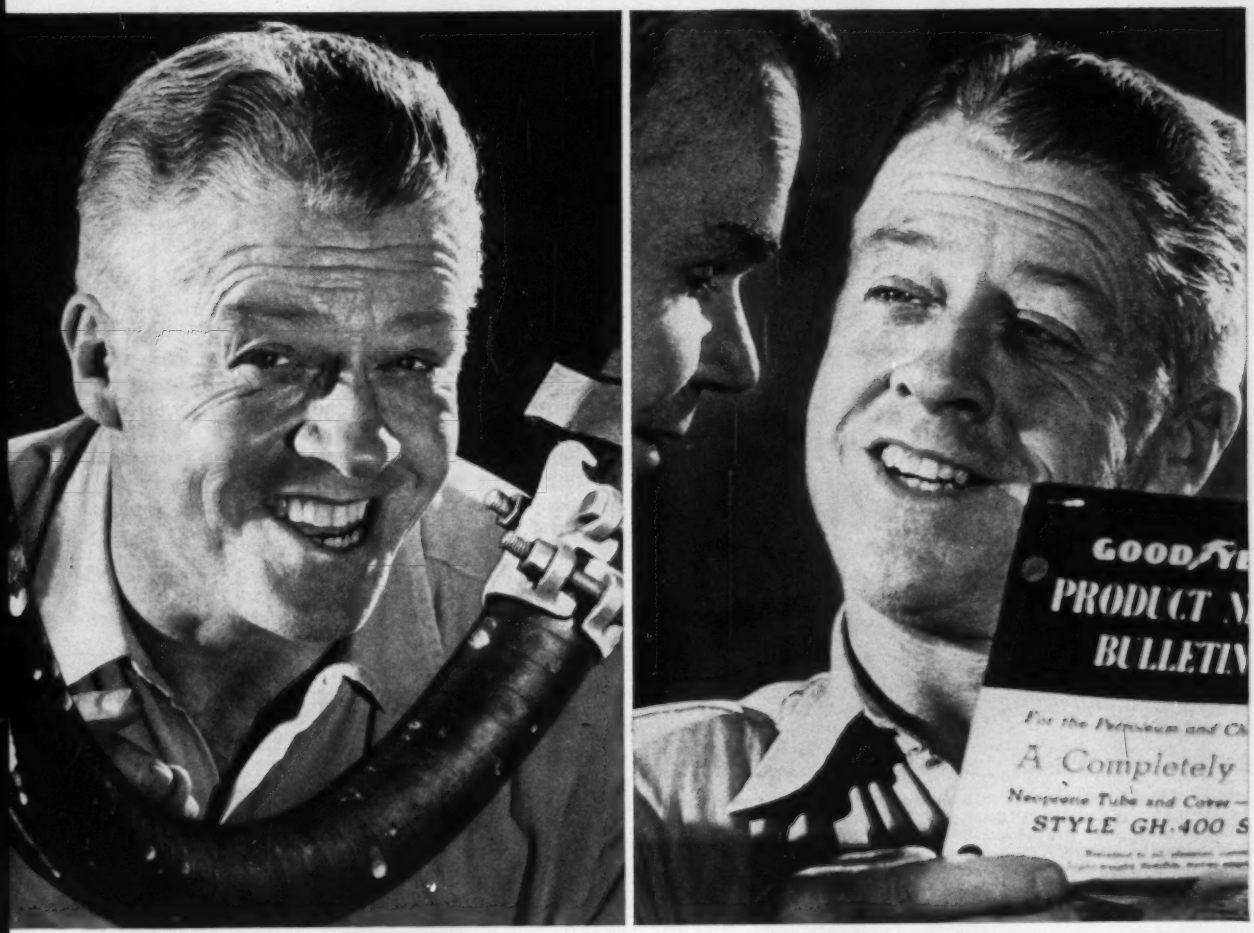
YOU GET THE RIGHT HOSE
(With the world's largest, most diversified line of industrial hose to choose from, *it's easy with Goodyear!)*

YOU GET FAST DELIVERIES
(With a big, nationwide network of stocking distributors to serve your needs, *it's easy with Goodyear!)*

For the right hose... at the right place... at your Goodyear Distributor... first in service

Lots of good things come from **GOOD**

the easy, Goodyear way?



YOU GET UNMATCHED QUALITY
(With more than 50 years of pioneering research and development backing hose quality, *it's easy with Goodyear!)*

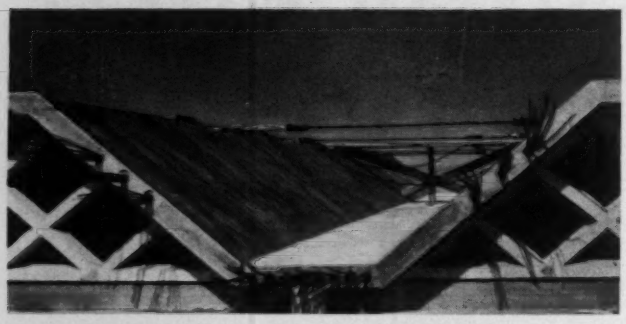
YOU GET EXPERT ADVICE
(With a trained hose expert like the G.T.M. – Goodyear Technical Man – always on call, *it's easy with Goodyear!)*

the right time... at the right price... call with all industrial rubber products

Or write Goodyear, Industrial Products Division, Akron 16, Ohio

GOODYEAR INDUSTRIAL PRODUCTS

POST-TENSIONED CONCRETE FOLDED PLATE ROOF



Above—The width of each corrugation is 22′. Top and bottom flanges are 8″ thick; inclined webs are 5″ thick. The rods and turnbuckles were used to provide temporary lateral support pending placing of concrete for 8″ open joints between adjacent plates. There are 8 straight post-tensioning cables in the bottom flange of each plate, 3 draped cables in each web. Note, also, the precast concrete window grilles which function as diaphragms.

For 50 Lane Bowling Center

• How to provide 34,000 unobstructed square feet of floor area, in an economical but attractive building, and do it in 7 months from drawing board to grand opening? The answer—use of concrete folded plates, post-tensioned in place, in the recently completed Cloverleaf Lanes Bowling Center, Dade County, Florida.

Lehigh Early Strength Cement Permits Post-Tensioning After 3 Days

Contractor for the plates, John B. Orr, Inc., achieved top efficiency with two sets of forms (for two corrugations each) and Lehigh Early Strength Cement. The concrete, supplied by R. H. Wright, Inc., reached specified post-tensioning strength in three days, meshing neatly with the four day cycle required to strip, move and reassemble a set of forms. There were no delays.

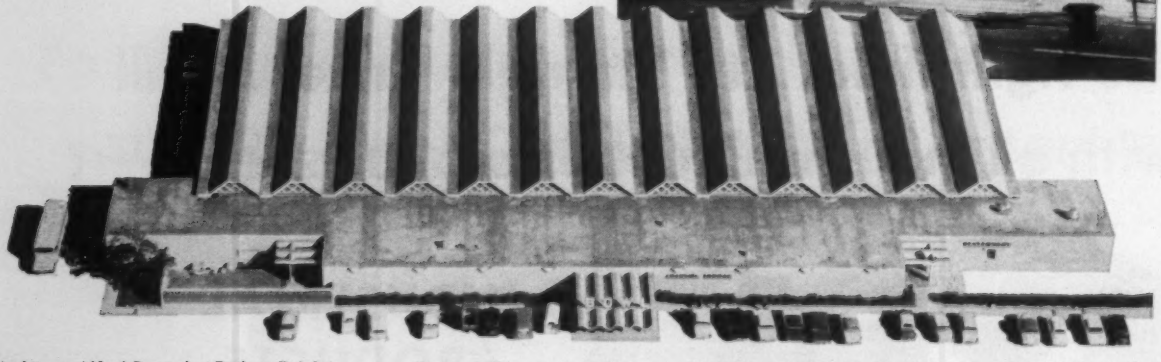
For modern concrete construction, either precast or cast-in-place, chances are Lehigh Early Strength Cement can save you time and money. Lehigh Portland Cement Company, Allentown, Pa.

LEHIGH CEMENTS

Above—Concrete folded plates span approximately 125′ and extend the 286′ length of the building. Overall depth is 6′. Plates are supported at one end on columns, at the other by a block wall framed with columns and beams. Even at this stage of completion, it can be seen that the visual effect of these plates will work well with rows of bowling lanes.

Right—Foyer of the bowling center is roofed with 44′ long prestressed double tee beams supported on continuous beams resting on 22′ column centers. The tees were made with Lehigh Early Strength Cement at Wright's Dania plant and trucked to the job site.

Below—Cloverleaf Lanes Bowling Center, now complete at Dade County, Florida.



Architect: Alfred Browning Parker, F.A.I.A. *Engineer:* Dignum Associates *Contractor:* John B. Orr, Inc. All of Miami, Fla.

Prestressed Double Tees and Folded Plate Post-Tensioning: R. H. Wright, Inc., Ft. Lauderdale, Fla.

The seal above and the man at right may both be upgraded in the federal government. The seal: HHFA. The man: Robert C. Weaver.

HHFA: Headed for the Cabinet?

By Donald O. Loomis

President Kennedy's message to the Congress on housing and community development (see p. 26) marks a turning point in the long history of the homebuilding market in this country and of the federal government's part in bolstering it.

President Kennedy proposes to give new emphasis to a wide variety of grant, loan, and insurance programs through the existing housing agencies. He would give them authority to make credit easier on the lowest priced houses, recognize the need for rehabilitating and modernizing existing homes, stimulate housing programs for the elderly, give cities more discretion in the fashioning of urban renewal programs, and give a new look to public housing.

The Administration's policy is based on the fact that the huge postwar surge to the suburbs is dwindling, and that housing now should be considered as part of over-all plans to make metropolitan areas—central cities and suburbs alike—more liveable. This means more consideration for renewal of blighted areas, but also making highways and rapid transit systems, for instance, an integral part of the planning.

The President's programs would be carried out by the federal housing agencies created over the past 30 years either to meet one housing crisis or another, or to supply housing to families who couldn't afford it without the federal assistance. These agencies are Federal Housing Administration, Urban Renewal Administration, Public Housing Administration, Community Facilities Administration and Federal National Mortgage Association.

These agencies—back in 1947—were put under a single Housing and Home Finance Agency, headed by a Housing Administrator. The purpose, of course, was to give direction, coordination and supervision to the constituent agencies.

Now, however, Mr. Kennedy emphasizes the increasing importance of housing—and the increasing need to coordinate housing with other governmental policies and programs—by recommending creation of a Department of Housing and Urban Affairs at the Cabinet level.

Congress seems almost certain to go along with the President's recommendation to give housing a seat at the Cabinet table. But there is one imponderable hanging over this and—in fact—over the Administration's entire housing program.

That is the issue of federal policy on desegregation in housing financed in whole or in part by the federal taxpayer's dollar. The issue was dramatized by Mr. Kennedy's appointment of Robert C. Weaver, 54, a Negro, as Housing Administrator. Mr. Weaver, admitted by all to be a housing expert and an able administrator, is a strong advocate of "open occupancy"—that is, against segregation in housing built through the aid of tax funds.

Mr. Weaver and others insist, however, that he (or any other Administrator) is bound completely by the President on all such issues, and by the laws now on the books. Where the law is fuzzy and on matters of interpretation of the law, he could not act on his own, but only at the President's direction.

The fact is that Mr. Weaver knows he has to operate in the political environment that exists in Washington, and that the constituent agencies of his organization in fact are sensitive to interests whose views have to be respected. Among these interests are the homebuilders; the heavy construction firms that redevelop urban areas; the mortgage bankers, insurance companies and other lenders; the mayors of cities and city planners; and, of course, the voters themselves, who buy or rent housing, borrow money on insured loans, pay the interest rates.

The Federal Housing Administrator is also somewhat limited even in the influence he can, by law and tradition, wield with the separate agencies of HHFA. The power of FHA, for example, is invested in that agency's chief. In the case of the Community Facilities Administration, the Urban Renewal Administration and the Public Housing Administration, the powers are vested in the Housing Administrator and delegated to the individual commissioners.

(Please turn the page)

***Don Loomis** pounds the housing and finance beat in ENR's Washington Bureau. He began writing for ENR in 1947—the same year the HHFA was formed.*

. . . Profile of the HHFA

and CFA. By law, the Housing Administrator appoints the commissioners; in fact, of course, the White House makes or approves all such appointments.

With FNMA, the powers of the agency are vested in the corporation. The Housing Administrator is chairman of the board, but in fact, the agency is run directly by its president.

The new Department of Housing and Urban Affairs will be proposed separately around the end of March, when the omnibus housing bill goes to Congress.

At the moment, Administration officials are still undecided whether to submit legislation or whether to send a reorganization plan to Congress. (Congress has not yet given the President authority to reorganize. A bill has passed the Senate, though, and is expected to go through the House with little difficulty.)

But one thing seems certain—the new department will consist entirely—or almost entirely—of the agencies that now make up the HHFA. Mr. Kennedy's message seemed to underscore this when he said that housing and community development programs ". . . should be constantly brought to the Cabinet table, and coordinated leadership provided for functions related to urban affairs but appropriately performed by a variety of departments and agencies."

Here, then, is a profile of the agencies that now make up HHFA and may before long make up the Department of Housing and Urban Affairs:

I. FHA

The Federal Housing Administration is the oldest brother and therefore the first among not-quite-equals in the HHFA family. It was created by the National Housing Act of 1934, a full 15 years before Senator Robert A. Taft pulled together all the various federal housing functions under one mother agency in the housing acts of '48, '49, and '50.

Thus Neal Hardy, FHA's new chief, will be heading an organization with a strong political base of its own, one with considerable independence. For example, the head of HHFA has no authority to direct FHA to do anything; he has only the power of persuasion in his authority to supervise and coordinate.

Some critics contend that along with FHA's seniority has come a certain hardening of the arteries. You can expect Mr. Hardy to make a stab at revitalizing his agency to meet the changed condition of homebuilding now that the suburban construction boom seems to have about run its course.

• **What FHA does**—FHA's largest job is insuring against loss those who lend to builders and homeowners on single-family to four-family housing. A builder's plans and drawings are submitted to the FHA office. FHA makes an appraisal and gives a commitment that it will insure the mortgage on such homes up to a given amount. With this commitment the builder can borrow construction funds much more easily than he might otherwise. FHA last year insured 366,757 mortgages, including 168,343 new homes and 49,074 apartment units.

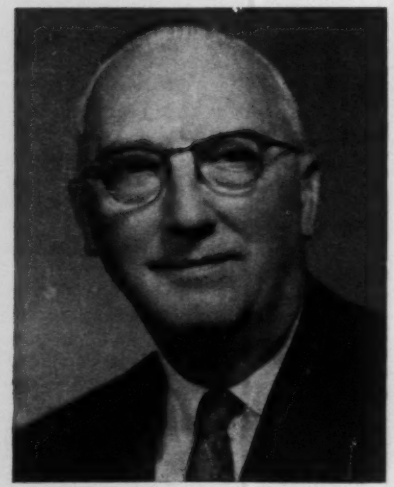
In the normal course of events, the homes are built and sold with the new owner assuming the FHA-insured mortgage. The builder pays off the lender and pockets his profit. The homeowner starts paying the lender, who passes along the monthly insurance premium to FHA.

FHA appraises the land, the location, the credit of the borrower, the builder, or developer. FHA inspects the house three times: when the foundation is placed, when the house is roughed in, and when it is finished.

For rental housing and other multi-family projects built under a wide variety of special programs, FHA insures construction advances, and in general exercises much closer supervision over the entire project and much closer inspection of the construction as it goes along.

The 65 local insuring offices are virtually autonomous as far as all these operations are concerned. They receive applications, insure loans, supervise completion of the projects without having to clear with either regional offices or with Washington—except, of course, where appeals or disputes arise.

Men already on the HHFA team



FNMA PRESIDENT J. S. BAUGHMAN has been in the post since 1950, when he was appointed by President Truman. He had served with the Home Owners Loan Corp. for 17 years before that.

FHA CHIEF NEAL J. HARDY was plucked by President Kennedy from his job as director of the National Housing Center of the National Association of Home Builders. He has served in HHFA before.

CFA CHIEF SIDNEY H. WOOLNER has held several posts in Michigan State government, the last one being executive secretary to Gov. G. Mennen Williams. He was once deputy highway commissioner.

• **The problems ahead**—The main problem facing the housing industry—and FHA—in the years ahead will be finding ways to tailor houses to fit new markets. The backlog of demand for housing buildup during the World War II appears to have been met. In the years after the war, Americans produced bumper baby crops—but there's still a good five to ten years to go before that's translated into a heavy demand for housing. The question is, what to do between now and then?

The answer, according to many homebuilders, is shoot for the "middle-income" housing markets—houses selling for up to about $15,000. There will be pressure for more house for the money, lower down payments and longer maturities.

To finance such homes may require some change in standards. FHA, for example, may come to recognize the reality of the "working wife." At present, a wife's income—unless she is beyond child-bearing age—cannot be counted in determining whether a family's income is sufficient to justify FHA insurance.

Building costs, of course, are a major problem in providing good housing at a low price. So you can expect growing pressure to bring building codes and standards up to todays materials and technology. In this area, as much as FHA would like to help, it operates with one hand tied behind its back—FHA's local insuring offices are autonomous; they have the final power to decide whether new designs, materials and techniques qualify for insurance.

Another housing area that is just now coming into its own is housing for the elderly. The first federal program designed to stimulate this special market was introduced in the Housing Act of 1959. Last year, FHA insured 7,154 such units.

II. URA

Urban renewal—which got a new push under President Eisenhower in 1954—is undoubtedly the first ripple of the wave of the future in housing. It goes way beyond the simple idea of slum clearance—that is, knocking down old neighborhoods and building new low-cost housing in its place.

Urban renewal makes it possible for federal and city officials to rehabilitate whole sections and areas according to a plan that takes into account transportation, shops, entertainment facilities, restaurants and the like.

Some sociologists say the suburban tide is about to flow back to the urban beach. If they are right, if the growing literature of suburban disenchantment is a herald of a changing attitude toward the city, then urban renewal and the Urban Renewal Administration could well become a key government agency for construction.

• **What URA does**—Here is how a renewal project comes to pass:

A community first confers with URA as to what it might like to do, then submits an application for a planning advance along with an estimate of the over-all net cost of the project. The net cost is the difference between the cost of preparing the site and the price the developer pays.

With the URA planning advance, the local housing authority takes anywhere from 12 to 18 months to come up with a final plan. This lays out the schedule of operations from beginning to end—land acquisition, demolition, site clearance, plans for relocating displaced families, final land use, plans and specifications for the road pattern, housing and other facilities to be erected.

URA usually pays about two thirds of the "net cost" involved in bringing the site up to the point where it can be sold to a private developer.

Before any work can begin on a project, public hearings must be held. Only after such hearings—and many amendments of the plan, usually—can the local agency come back to URA for a contract that commits the agency to loans and grants.

As work goes along, URA makes progress payments to help the city meet costs of demolition and construction.

Regional URA directors, who operate under the six regional housing administrators, have great authority. Only rarely do Washington officials have to suggest amendments or changes; regional recommendations are usually followed.

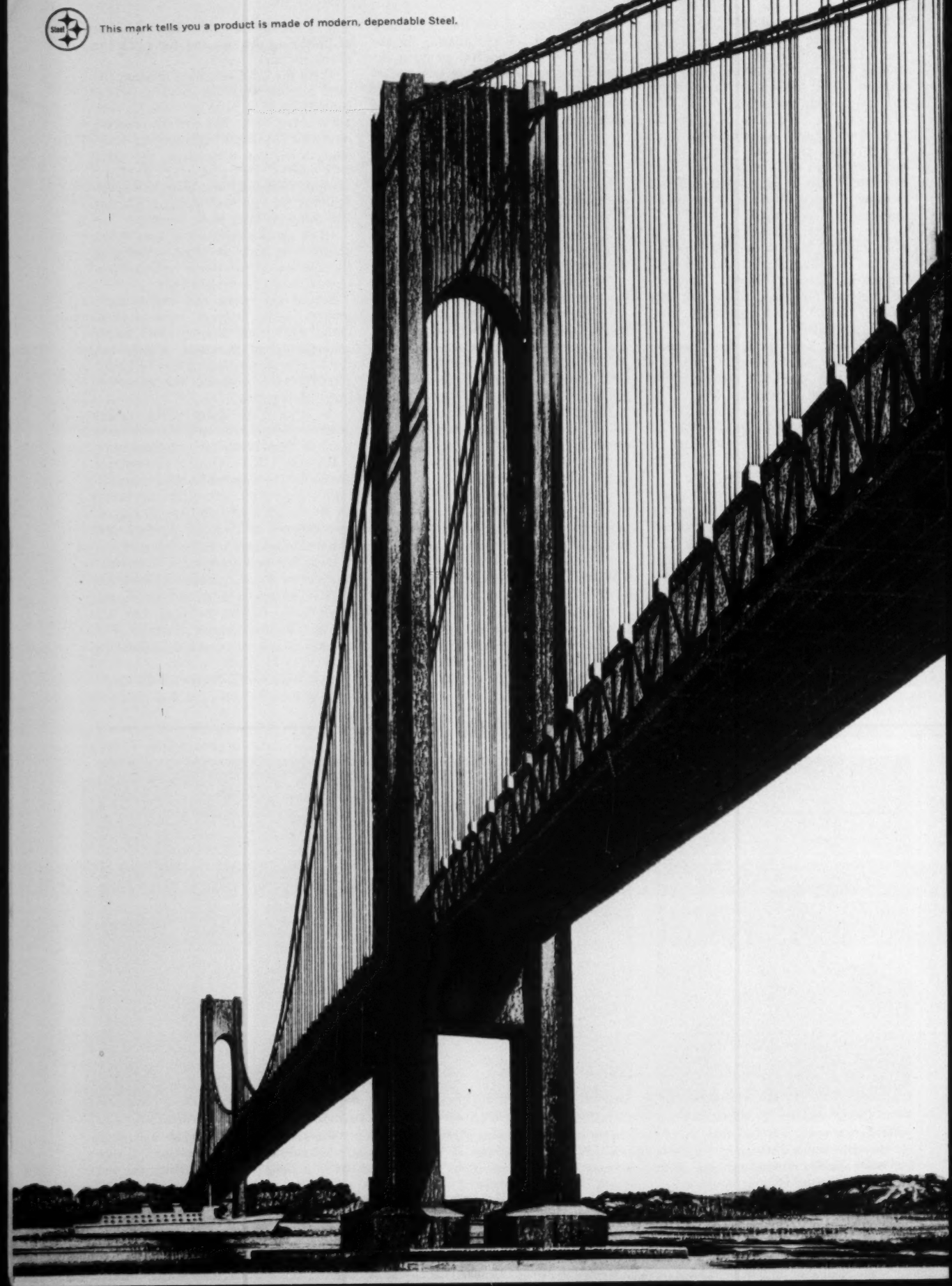
URA last year approved 171 renewal projects in 58 ciies, authorized $270.6 million in grants and authorized another $402 million in loans and advances. It had under contract 403 projects in 250 cities, and it finished 15 projects in 11 cities.

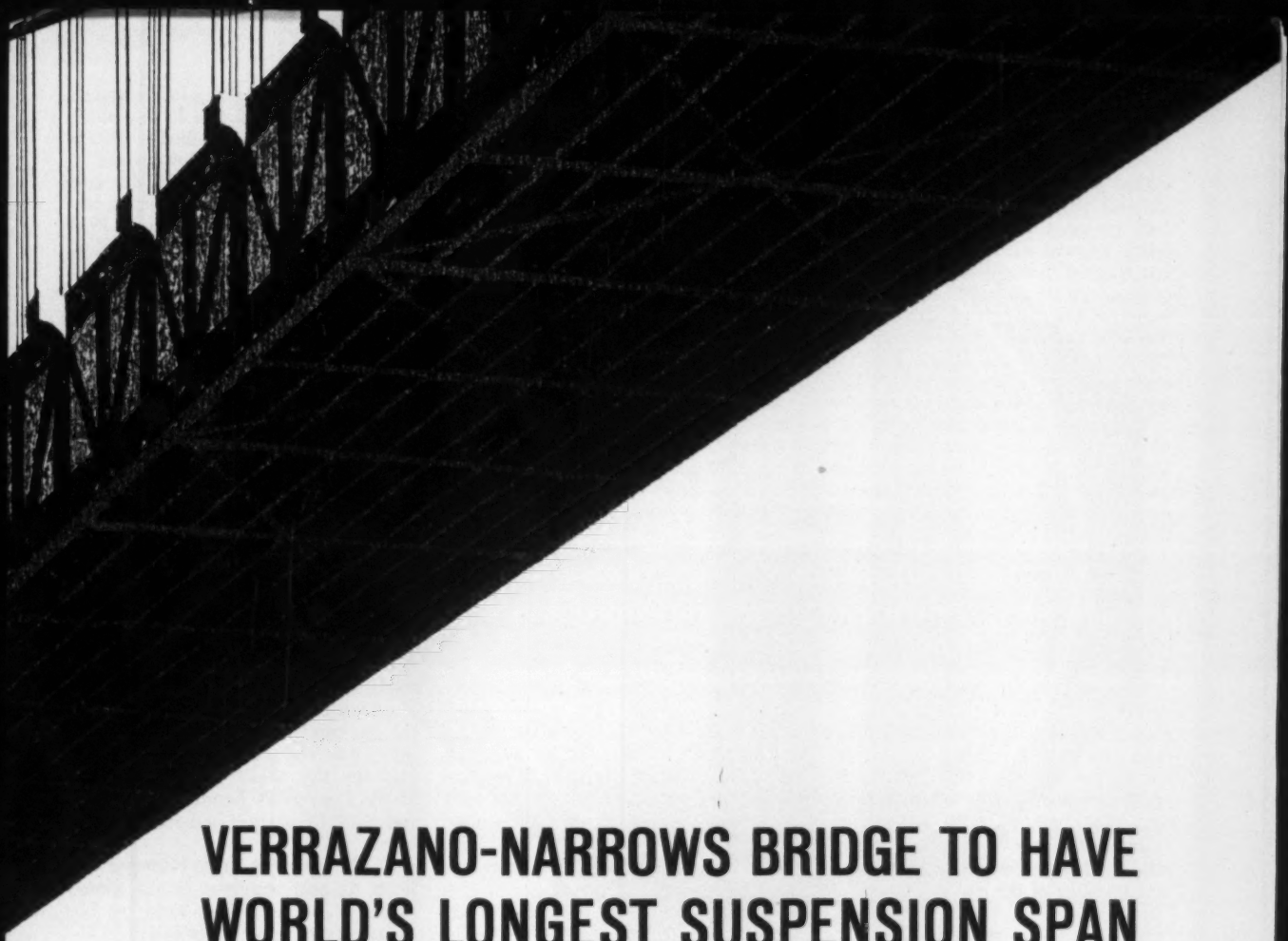
(*Story continues on p. 36*)

In the running for URA

PHA CHIEF MARIE C. McGUIRE, appointed this week, was executive director of the San Antonio Housing Authority. Previously she was assistant executive director of the Houston Housing Authority.

CANDIDATES FOR URA are William Slayton (left) and Thomas D'Alesandro. Mr. Slayton is a vice president of Webb & Knapp and a partner in I. M. Pei & Associates, architects. He is in charge of Webb & Knapp's $10-million redevelopment project that is being built in Washington. Mr. D'Alesandro is a former mayor of Baltimore and former U. S. Representative.


This mark tells you a product is made of modern, dependable Steel.



VERRAZANO-NARROWS BRIDGE TO HAVE WORLD'S LONGEST SUSPENSION SPAN

Main cables will include 28,500 tons of USS Tiger Brand Bridge Wire

The Verrazano-Narrows Bridge between Brooklyn and Staten Island will link the parkways and expressways of Long Island, Westchester and New England with the arterial systems of New Jersey and other states to the south and west. Traffic will be able to by-pass the congested streets of New York.

This bridge sets a new record for the longest center span of any suspension bridge in the world—4,260 feet—60 feet longer than the Golden Gate Bridge. The two side spans are each 1,215 feet long making the total length 6,690 feet.

The Verrazano-Narrows Bridge has been a dream for over 70 years. Its estimated cost is $320,000,000. Plans call for double-deck roadways providing 12 traffic lanes. The main towers are 673 feet high and the lower deck at mid-span will be 228 feet above water.

Main cables. Each of the four main cables will be 35⅜" in diameter and will consist of 26,108 individual wires. The cables will be spun from 146,000 miles of No. 6 gauge Galvanized Bridge Wire—enough to stretch nearly 6 times around the world.

In addition to the 28,500 tons of Tiger Brand Galvanized Bridge Wire, American Steel & Wire Division of United States Steel Corporation will furnish 1,048 Suspender Rope Assemblies, fabricated from 392,000 ft. of 2 9/16" diameter Tiger Brand Prestressed Galvanized Bridge Rope. Also, 56,000 ft. of 1-inch Galvanized Bridge Strand Hand Rope Assemblies and 575 tons of No. 9 gauge Galvanized Wrapping Wire.

American Steel & Wire not only has the engineering experience necessary for their role in this tremendous job, but also the vast facilities to produce the various types of wire, rope and strand. American Bridge Division of United States Steel will erect the complete cable suspension system which includes 38,500 tons of Bridge Wire, plus Suspenders, Hand Ropes and Main Cable Wrapping Wire.

For further information about USS Tiger Brand Wire Rope and Bridge Strand, write American Steel & Wire, Dept. 1106, 614 Superior Ave., N.W., Cleveland 13, Ohio.

USS and Tiger Brand are registered trademarks

American Steel & Wire Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, Distributors Abroad

. . . Profile of the HHFA

(Continued from p. 33)

• **The problems ahead**—Some experts contend that local officials were not fully prepared or informed to handle urban renewal when the program was first enacted. Some of the early renewal projects can be counted as at least tactical mistakes. Many early projects were too large and took too long a time to complete. The program has suffered because taxpayers for long periods of time saw nothing for their money but rubble.

The trend in urban renewal now is toward smaller projects, and that should help. These are apt to be less complex, raise fewer political obstacles, and in general translate tax money into steel and concrete a good deal faster.

The feeling is that the long shakedown cruise is over. Local politicians are getting more in step with the planners and vice-versa. And the first projects are now producing satisfactory tax revenue.

The two major complaints heard against the program are that it takes a project too long to get through the red tape, and that the federal government doesn't pay enough of the cost. As part of its new look at the urban renewal, the Administration will probably try to hasten the processing of information, but it probably won't be anxious to pick up more of the cost.

III. PHA

Public housing, like most other federal housing activities, is a depression baby—but it's the backward brother. Created in 1937 to meet a real need for adequate housing among low income families, it is today thrashing about for ways to adjust to a more affluent society.

Public housing, and the Public Housing Administration, still have an important part to play—many families cannot afford the product of the private housing industry. Last year PHA completed 15,566 units in 161 projects, was working on 37,095 units in 237 projects and authorized 76,910 units in 438 projects.

But the old ideas in public housing have about petered out. Watch for new steps in Washington to make the program more attractive.

• **What PHA does**—Here's how a public housing project comes to pass:

After receipt of an application from a local housing authority explaining its need for public housing, a PHA official investigates the situation. With approval from the regional PHA office, the local authority draws up preliminary plans and asks for a preliminary loan contract to execute final plans.

When the local authority is ready to break ground, PHA will execute an annual contribution contract to make up the difference between what the rents will bring in and what it costs to operate the project, maintain it, make payments to the community in lieu of taxes, and pay off the bond holders.

PHA will also lend up to 90% of the total cost of developing the project. This is paid back with interest when the housing authority floats its bond issue.

PHA exercises supervision to see that requirements of the law and regulations are met—but the local housing authority hires the architect, hires the construction contractor and the like.

The seven regional PHA offices carry most of the work-load; but the Washington headquarters makes final decisions on annual contribution contracts, preliminary loan contracts, and the like. Actually, the President's approval is required for annual contribution contracts, but this authority has been delegated to the Housing Administrator.

• **The problems ahead**—The new look in public housing will be small projects (some as small as a single living unit) more widely scattered and much more attractive than public housing of the past. There will also be more attention to old houses.

The purpose of this change in direction is to make public housing less of a blot on the urban landscape. The large institutional looking public housing projects are more or less a thing of the past. Washington officials now recognize that the whole public housing program has suffered because the structures built have frequently been little improvement, aesthetically, over the slums they replaced.

IV. CFA

The Community Facilities Administration is a prime example of the government's tendency to hang new programs on an existing housing agency.

Originally, the agency's main function was to buy bonds of small towns that wanted to build water, sewer and gas transmission systems—but found it difficult to sell their bonds or to market them at anywhere near the going rates of interest. But to this limited function was added administration of a college housing program, and as the Kennedy Administration becomes more ambitious in the housing, medical and educational fields, you can expect CFA to expand further.

Last month the President directed CFA to remove the restriction that tended to limit aid to towns of 10,000 and under, and directed it to consider a wider range of facilities for assistance.

Thus CFA is now free to buy bonds to finance almost any facility—except schools—for a community of any size.

CFA has made its most dramatic contribution in the college housing program, which it administers. Since 1951 the agency has loaned some $1.1 billion for dormitories, faculty housing, dining halls and student unions. Congress recently expanded the program to finance construction of housing for student nurses and interns.

The regional director of community facilities operates under the regional housing administrator, but he has a great deal of autonomy from Washington. Although all approvals go to the capital for review, only a fraction of these are seriously double checked.

V. FNMA

The Federal National Mortgage Association (Fannie Mae) is by far the biggest mortgage banker in the world. It has handled more than a million mortgages worth more than $10 billion.

Fannie Mae acts as a central bank for the mortgage business in somewhat the same way the Federal Reserve Board acts for the banks generally, or the Home Loan Bank Board acts as a central bank for savings and loans institutions.

With authority from Congress, it floats its own securities in the money markets, and uses these funds to buy "seasoned mortgages" insured by FHA and VA at specified prices from mortgage bankers, insurance companies, and other institutions who lend on home mortgages.

Lenders who sell to FNMA have to buy stock in the agency; it acts as a quasi-public institution in the private mortgage markets.

There are exceptions, though. FNMA has been given the authority under the direction of Congress to buy up mortgages during recession times to pump new money into the housing market to stimulate homebuilding. Also, it is directed either by Congress or by the President to buy at par mortgages to support special programs. Among these: nursing homes, housing for elderly, urban renewal, cooperative housing, Capehart housing, and—during the last recession—$1-billion of purchases of "low and moderate priced" housing.

Fannie Mae operates through agency offices in five cities (Philadelphia, Atlanta, Chicago, Dallas, and Los Angeles) which are authorized to buy and sell. It has another office in New York—the biggest money market of them all—which only sells mortgages, but does not buy.

Last year some 630 firms sold mortgages to Fannie Mae; of these, 75% were mortgage companies.

time is money ■ Incor saves you time ■

how to build a 5,000-seat ball park in 9 weeks

Take 1,600 precast, prestressed concrete members made with Incor 24-hour cement. Erect them in midwinter on a schedule so tight that design drawings are still being turned out as construction progresses. Set a time limit of 9 weeks for the whole job, fabrication *and* erection. Result . . . Tacoma's fire-safe, 5,000-seat Cheney Stadium . . . ready for Opening Day.

With Incor on the team, you can save time and money on *any* job. Work gets finished faster. Men, forms and equipment are released quicker for other projects. Estimate your next job with Incor. You'll find it pays.

AMERICA'S FIRST HIGH EARLY STRENGTH CEMENT

INCOR®

LONE STAR CEMENT CORPORATION, NEW YORK 17, N. Y.

Cheney Stadium, Tacoma, Washington. Owner: Pierce County and City of Tacoma; Designers: Anderson, Birkeland & Anderson; General Contractor: Earley Construction Co.; Prestressed members: Concrete Technology Corporation (all of Tacoma).

Iran's Two

Of the several major elements in Iran's current development program to raise its living standards (ENR Mar. 9, 1961, p. 36) two concrete dams — Karadj and Dez — occupy outstanding strategic positions. They are the highest dams in the Middle East, among the

I. Karadj Dam:

By Waldo G. Bowman

The 590-ft-high double curvature arch dam approaching completion on Iran's Karadj River 25 miles northwest of Teheran will furnish that city with a 50 mgd. water supply and electric power, and provide the surrounding countryside with irrigation water.

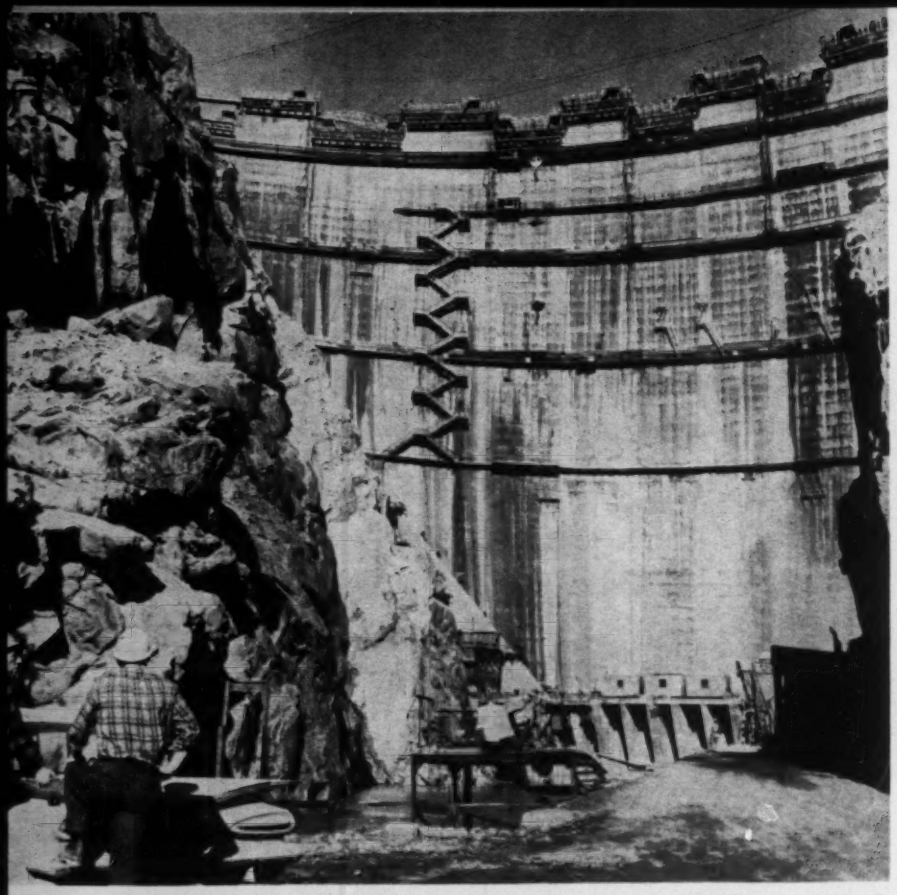
Karadj Dam has been remarkably trouble-free from start to finish. Partly this results from a good damsite, but more particularly it reflects efficient design and construction management on the part of Harza Engineering Co. and Morrison-Knudsen International, respectively. Nor was the job by any means easy or run-of-the-mill.

The Karadj site has some unusual characteristics. It is located in a canyon in the Elburz Mountains where the geology is a topsy-turvy mixture of sedimentary and igneous rock that would cause any self-respecting dam builder to shudder. Yet right at the spot where a dam should be, Nature behaved herself and provided a sill of hard diorite.

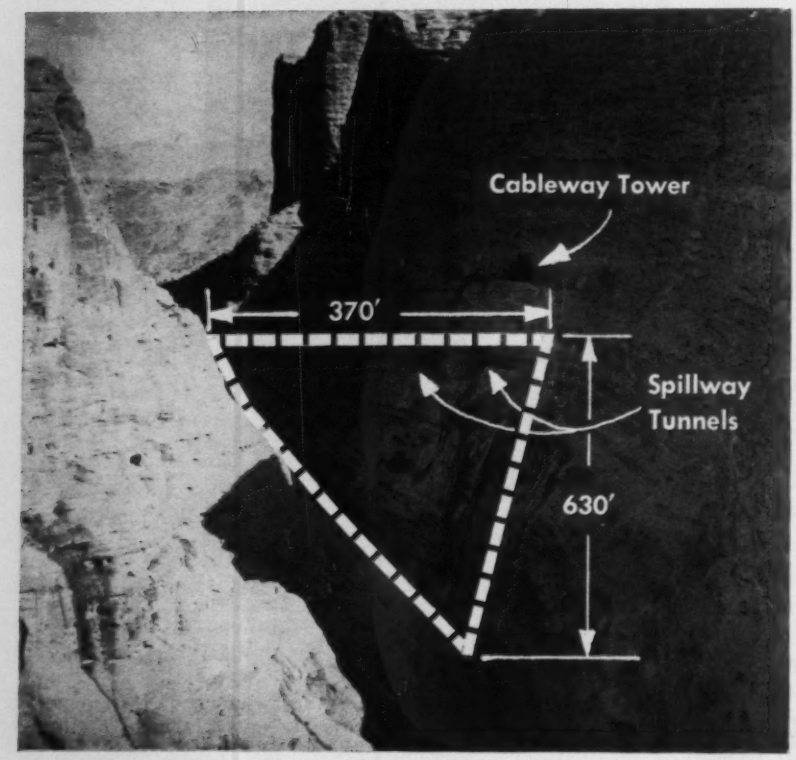
It isn't clear when this sill was first discovered, but a road from Teheran north to the Caspian Sea runs up the canyon (or did before the present construction) so the site has long been accessible for inspection. In any event, studies for a dam were made as early as 1937 by German engineers.

Later, French engineers made another study. And in 1954 a third study was made by a team from the U. S. Bureau of Reclamation. Both the French and U.S. studies suggested a high arch dam. Harza's studies in 1956, made at the request of the Plan Organization, resulted in the recommendation that a double curvature concrete arch 590 ft high be built.

The dam, 1,285 ft long at roadway level, is of constant angle shape, and will contain 960,000 cu yd of concrete. A power plant at its downstream toe provides space for three 40,000-kw



KARADJ DAM, a 590 ft double curvature arch to store water for Teheran, is approaching completion with 85% of its concrete in place.



DEEP DEZ RIVER GORGE will be blocked by a 630 ft double curvature arch dam thrusting against cemented conglomerate walls.

This is the last in a series of reports on construction activity in Asia and the Middle East by ***ENR Editor Waldo G. Bowman.***

Big Dams Promise a Better Life

highest in the world, and they encompass difficult design and construction problems, which in some instances are unique.

Karadj Dam will store water for the capital city of Teheran; Dez Dam will provide power and irrigation water for the extensive redevelopment of the southwestern province of Khuzestan. Both are projects of the Iran Plan Organization, a body set up to utilize the country's oil revenues in providing the country with all manner of modern facilities.

A Difficult Job, but No Hitches

units, and two of them will be installed initially. Since the project's main purpose is water supply, power will be generated for only a few hours at peak periods of demand at night; the discharge will be held for water-supply release in a 500-acre-ft reservoir created by a 165-ft-high concrete dam three-quarters of a mile downstream. This release will be made into the river and picked up five miles farther downstream by an intake into three new conduits Teheran has provided for delivery into the city's treatment plant and distribution system. All of these water supply facilities were designed by Sir Alexander Gibb & Partners.

Two valved conduit outlets through Karadj Dam at the right side of the power plant will also permit controlled release from the main reservoir into the re-regulating reservoir when power releases of water are insufficient.

The other principal element of the project is the spillway, a steep (45-deg) chute on the abutment rock at the right of the dam. Its discharge bucket will be some 50 ft above the tailwater pool. Since the spillway will frequently be used to waste water from the reservoir, flows will vary widely—perhaps from 1,500 to 50,000 cfs. As a consequence, the spillway will be narrowed and heightened at its lower end in order to "squeeze" the discharges into a jet that will land far enough out to prevent erosion under the structure. The spillway will be equipped with two 33-ft-high tainter gates and a central training wall so that only one half of it can be used for the smaller discharges.

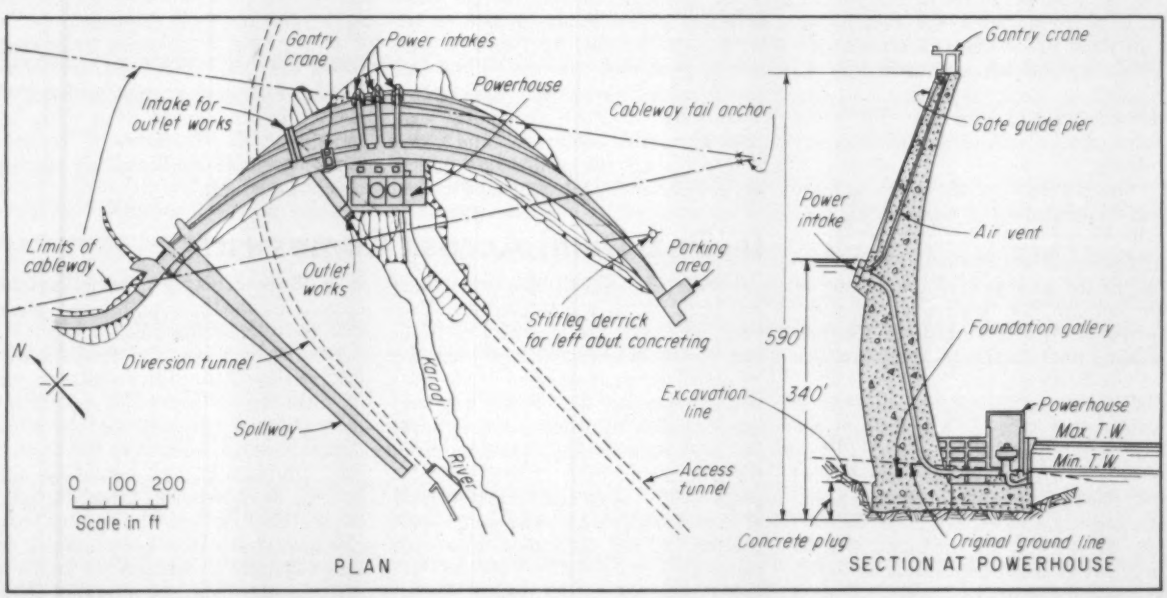
• **Model studies**—Because of irregularities in the foundation rock under the dam, the design provided that these should be plugged with mass concrete, and that the arch be analyzed as a symmetrical structure 550 ft high. The dam was designed by the crown cantilever method, then checked by three- and five-cantilever analyses and finally subjected to structural model tests. A trial-load analysis was also performed with an electronic computer.

Facts revealed or confirmed by the model studies were that no thrust blocks at the abutments would be necessary and that placing openings in the arch dam for the spillway crest would not materially affect the stresses. Rock modulus tests performed in the field revealed inconsequential differences with the modulus of elasticity of concrete, so that both the model and its foundations were made of the same kind of plaster.

• **No level space**—The overriding problem to be solved in the construction of Karadj Dam was to find a level area (which did not exist) on which to install the construction plant. Fortunately, the excavation of a bench on the right abutment for the cableway towers yielded sufficient material for a fill in an adjacent side canyon upon which the screening plant and the batching plant could be installed. But the operation involved the excavation and handling of 330,000 cu yd of rock, and cost $250,000.

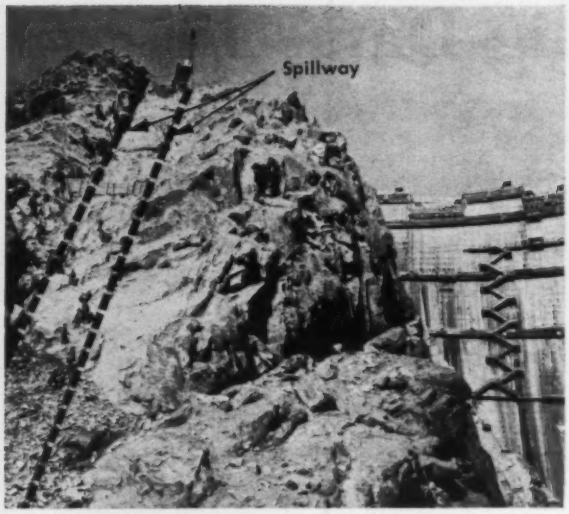
Other problems: six months lead time had to be allowed between ordering and receipt of foreign material and equipment; the equipment came from a half-dozen different countries; and three times as large a labor force is required as in the U. S.

Despite these problems and the fact that the dam is of major size in both height and volume, its construction has proceeded without delay in an opera-



LAYOUT OF KARADJ DAM reveals a compact arrangement of dam, powerhouse and spillway. Transformers and switchgear are fitted in between powerhouse and dam. Concrete foundation plug is 40 ft thick.

GOOD SITE is provided Karadj Dam on a relatively narrow sill of sound diorite in an otherwise geologically upset region.



STEEP CHUTE SPILLWAY for Karadj Dam poses a difficult problem in excavation and concrete placement.

tion blessed with excellent weather and no serious floods. One of the principal difficulties has resulted from the steep slopes of the canyon walls. The jointed rock on the walls has required considerable dangerous scaling and rock bolting to prevent rocks from falling on the workmen in the gorge.

• **Concreting**—Concreting operations have gone forward rapidly. The quarry is just downstream of the right abutment at the head of a side canyon. The screening plant and batching plant are below in this canyon on the 330,000 cu yd fill. Two 4-cu-yd mixers are used, discharging into transfer cars that move through a tunnel in the right abutment to a platform under the two 25-ton cableways. All of the dam except some blocks in the left abutment can be reached by these cableways. A stiffleg derrick benched into the cliff above these blocks rehandles the cableway buckets.

The concrete on the steep spillway will be placed by a separate inclined cableway rigged between a mast set up at the top of the chute and an anchorage in the rock face of the canyon at the bottom. The transfer cars from the mixing plant will bring the concrete to where a hook on this cableway can pick up the buckets.

Concrete in the dam is being placed in 6½-ft lifts. After 24 hours it is "green cut" with jets of water and air. Three days later it is sandblasted and washed off, the cooling coils are installed and the forms are raised ready for the next lift. Steel forms are used, and a three-bag mix is producing excellent 5,000-psi concrete with the low-alkali cement being used.

The refrigerating plant has an 800-ton capacity, and when in full operation circulates about 1,000 gpm. River water is often cold enough to dispense with refrigeration. Two-stage cooling is being practiced. In the first stage, the heat of hydration in the concrete is dissipated. In the second stage, just prior to grouting the contraction joints, water is again circulated to reduce concrete temperature 5F below the mean average temperature of 54F. The second stage will be carried out under closed-system circulation to reduce the head on the pumps and to conserve the water from which sediment has been removed.

Excavation for the dam and powerhouse, exclusive of construction plant benches, totaled about 400,000 cu yd. At the powerhouse the depth to rock was so great that concrete backfill had to be placed under the draft tubes. Temporary diversion conduits were placed in this concrete, and then plugged when the permanent outlets at the right abutment went into service.

• **Work force of 3,000**—The present Iranian labor force is in the neighborhood of 3,000. There are about 100 Americans and 50 other nationalities in supervisory positions. The basic common labor rate is 13 cents an hour, but skilled labor commands considerably more, a mechanic foreman getting about $1 per hour. Fringe benefits—social security, hospital allowances, etc. —which must be added to these rates, probably increase them about 50%. There are 10 holidays and 12 days vacation each year that must also be paid for. Finally, because of the necessity for employing about three times as many men as on comparable work in the U. S., the labor cost per unit of work comes out about the same.

Karadj Dam is scheduled to be completed next May. For MKI, Harold E. Buckert is project manager and C. W. Bolton project engineer. For Harza International, R. E. Brown is resident engineer and H. E. Richardson deputy resident engineer.

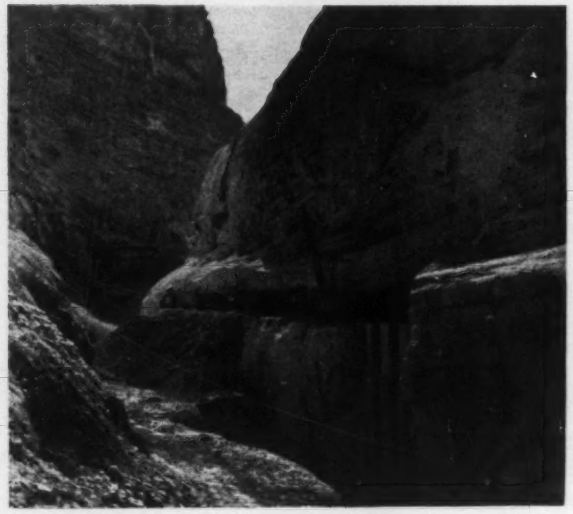
II. Dez Dam: Access Comes First

Unlike the Karadj damsite, which had been known and studied for thirty years or more, the site of Dez Dam had gone unrecognized until revealed by aerial reconnaissance in 1956. Nor is this surprising, since it was as nearly inaccessible as damsites ever get. Some 15 miles back in the mountains from the plains, the site is at the head of a gorge 1,200 ft deep and only 40 ft wide at the riverbed level. The gorge walls rise only 30 deg off vertical to a wide plateau.

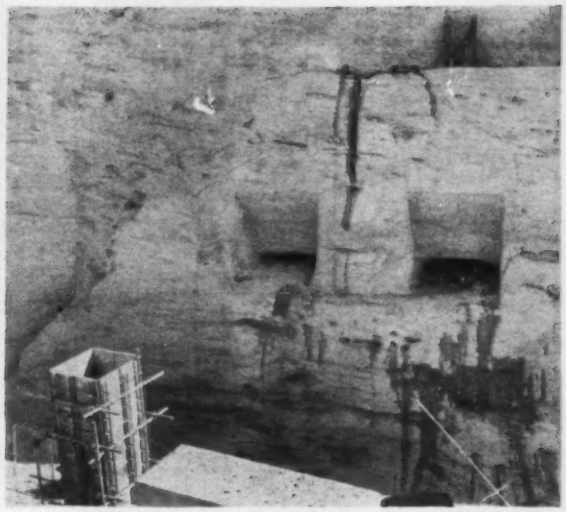
No one but an occasional sheepherder had any reason to go up onto this plateau, while the river, dropping in a series of rapids and filling the bottom of the canyon, blocked travel into the site by this route.

Nevertheless, the site forms a perfect setting for a dam, with the valley opening up beyond it to provide reservoir space. In addition, the foundation rock is deemed to be satisfactory, although certain precautions will have to be observed in fitting the dam to it. The rock is a limestone conglomerate fused into a resemblance of lean concrete. It contains no faults or cavities, but there are previous zones that will require grouting.

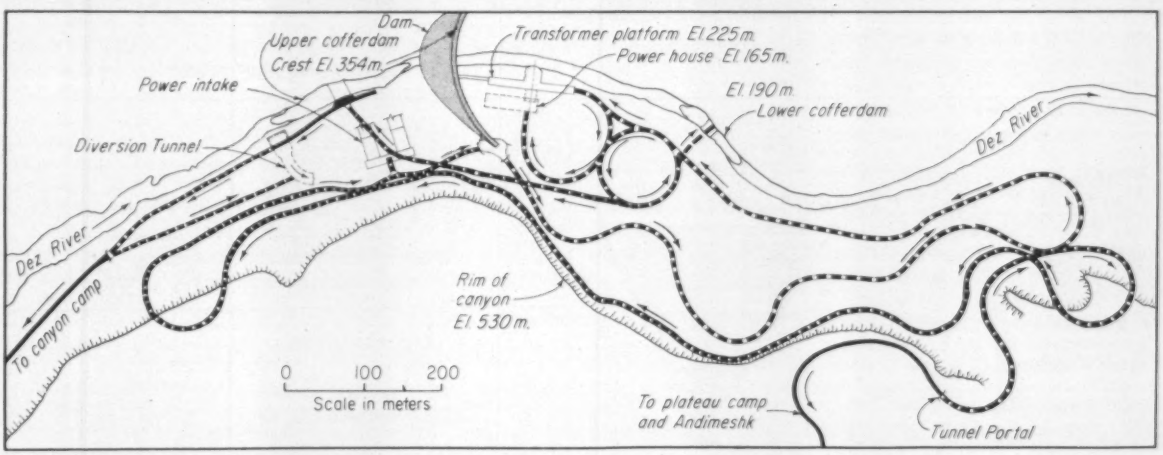
The type of dam selected is a double



UPSTREAM COFFERDAM created by dynamiting the canyon walls blocks the Dez River. Diversion tunnel intake opposite.



TOEHOLDS IN SHEER CANYON WALL provide benches for cableway tower and spillway tunnel portals at Dez damsite.



SPECTACULAR SERPENTINE TUNNEL had to be drilled in canyon wall to provide access to Dez Dam site. For two-way traffic, it winds for 4 miles in dropping 1,500 ft from the plateau to the underground powerhouse.

curvature concrete arch rising 630 ft from its deepest foundation, spanning 370 ft across the canyon in a curved length of 820 ft and having a volume of 520,000 cu yd. A dam to this height will back up a reservoir of 2.7 million acre-ft of which 2 million acre-ft will be live.

An underground power plant on the right bank, fed by a 33-ft-dia tunnel from which four 13-ft-dia penstock tunnels branch, will provide space for four 65,000-kw generators two of which will be installed initially. An additional river intake and power tunnel are also included in the first phase so that a second power plant of the same size can be built in the future, raising the ultimate capacity of the installation to 520,000 kw.

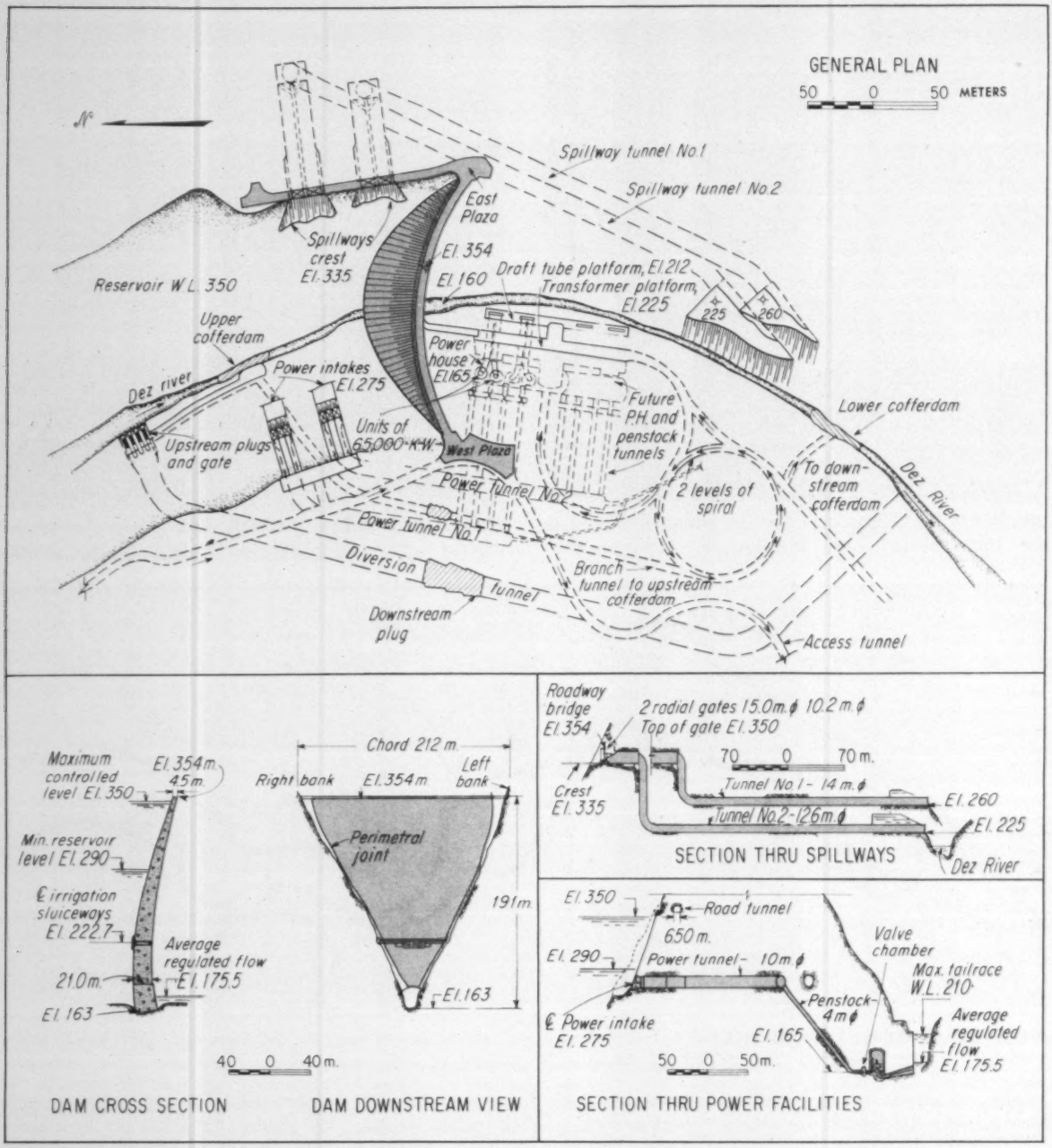
Two 1,300-ft-long spillway tunnels, one 46 ft and the other 41 ft in diameter, will be located in the left bank to discharge a total of 210,000 cfs. There will also be three 5-ft-diam sluiceways, installed in the dam itself about 425 ft down from the top, for irrigation and flood control discharges. At minimum reservoir level these sluiceways have a capacity of 5,500 cfs.

• **Access the problem**—All of this layout was very neat and proper, but there remained the problems of access to the dam and the powerhouse sites and of providing space at the top of the canyon walls for the various items of construction plant that would be needed. It is solely with these problems that the builders of Dez Dam have been concerned since the summer of 1958.

Access operations had to begin out on the plains at the railhead town of Andimeshk, from where a trucking road was built winding for 15 miles up onto the plateau. But this did little more than provide a view of the damsite 1,200 ft below, to which the road had to be carried. Because of the steep canyon walls the only feasible route down was via a tunnel, which, after switching back and forth on a maximum 8% grade, extended nearly four miles.

The plateau access road, most of the tunnel road, the 50-ft-dia diversion tunnel and the initial construction camp facilities were built by Morrison-Knudsen International between the summer of 1958 and December 1959. At that time the main contract for the dam, powerhouse and spillway structures was won by Impresit-Girola-Lodigiani, a joint venture of Italian contractors. All work since that date has been carried out by this firm.

It is doubtful if a more concen-



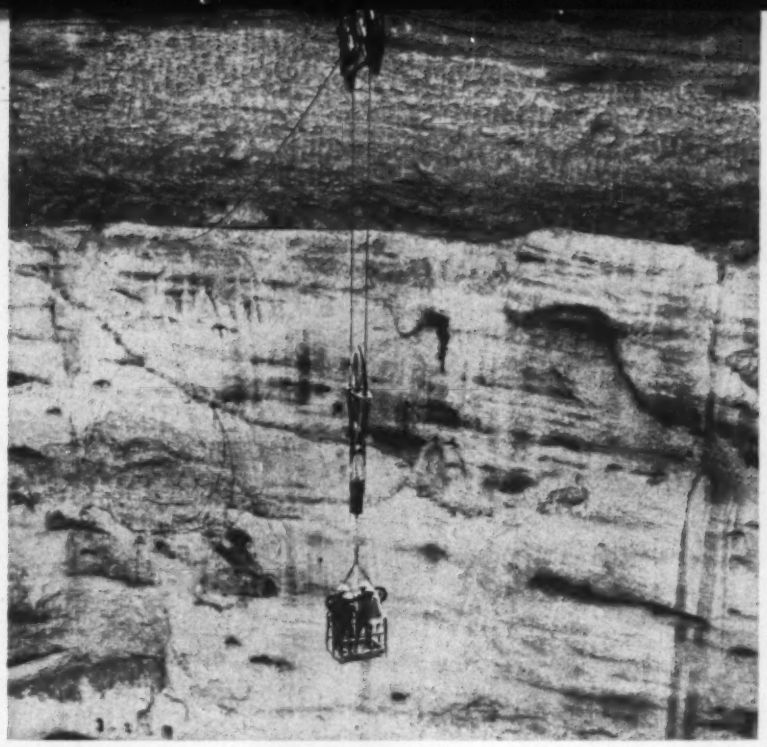
AT DEZ DAM the right abutment wall is pierced by a maze of tunnels and a powerhouse cavern, the right wall by two huge vertical-drop spillway tunnels. The dam itself rises from a load distribution saddle that separates it from its foundations.

trated maze of tunnels as exists in the right bank of the Dez project has ever been required on a dam job before. The access road tunnel is particularly notable. In laying out its winding descent, a fundamental consideration was to keep it fairly near the canyon face so that short adits out to the face could be provided at intervals for disposing of the mucked out material. On the way down, too, access out to the canyon face had to be provided to the top of the dam (El 354 meters) about 580 ft below the canyon rim, to the transformer platform (El 225 meters) about 1,000 ft below the canyon rim and to the powerhouse, cofferdams, and the diversion tunnel portals at river level 1,200 ft below.

As shown in the accompanying drawings of the Dez project elements, this access tunnel, in order to reach the powerhouse, had to follow a figure-eight spiral layout, traffic going completely around the first circle of the "eight" on an upper level and then about halfway around again on a lower level before entering the other circle of the eight that leads into the powerhouse.

The access tunnels are 25 ft in diameter to provide for two-way traffic. The diversion tunnel is 50 ft in diameter, 2,200 ft long and has a discharge capacity of 70,000 cfs at a river stage elevation of 215 meters, the top of the up-stream cofferdam. The powerhouse cavity is 250x58 ft and 117 ft high. All this underground excavation, including also the power and penstock tunnels, was carried out without resort to any roof supports. Water was encountered only below river level and there only in easily handled quantities.

• **Water diverted**—River diversion was accomplished last July when the upstream cofferdam was created by dropping about 25,000 cu yd of the can-



ONLY ACCESS to the left wall of Dez Canyon where the spillway tunnels are located is via a highline cableway from the right bank.

yon walls into the river by a blast of seven tons of dynamite in a three-delay shot. The drilling pattern had been arranged so that the broken rock would be graded from small size upstream to coarser downstream, and a rough approximation of this result was obtained. The contractor later drove a line of steel sheetpiling along the upstream toe, and will blanket the upstream face with more fine material to achieve maximum watertightness.

Present activities at the Dez damsite are still concerned with exacavation, but, instead of being inside on tunnels, it is outside, high up on the canyon walls. Here benches are being cut for the installation of the cableway and the concreting facilities, and also under way are abutment preparations—scaling and keyway cuts. The benching work for the concreting facilities is on the right wall, while opposite on the left wall a bench has been made for the head tower of the cableway, and directly below this two benches have been completed from which excavation of the spillway tunnels is just beginning.

To carry out this left wall work, a high line has been installed across the canyon to transport the men and materials. Bulldozers, shovel loaders, compressors and trucks have been carried over by this highline, which has also been used to assemble the headtower of the main cableway. Much of the excavated material from this b ching and scaling work must necessar y be dropped into the bottom of the canyon. It will have to be removed when excavation for the dam foundation in the river bed commences. In preparation for this operation a tunnel is being driven under the river. Trucks will be driven into the tunnel and loaded from holes in the roof. The tunnel will be extended to near the site of the upstream cofferdam where the disposal area will be located.

• **Materials handling**—The layout of the concreting facilities on the right bank is shown in an accompanying illustration. Highest up, almost to the top of the plateau, are the cement bins and the aggregate stock piles from which the materials will be fed by drop shafts, tunnels and belt conveyors to the mixing plant some 600 ft below. The Type II cement will come from a new plant at Dorud by rail to Andimeshk in 10-ton steel containers, which will be transferred by an overhead crane to flatbed trailer trucks for transport up the 15-mile mountain road to the cement bins. Fifteen 2,000-ton bins are provided in order to assure that enough cement will always be on hand for the 600 tons of cement a day that the concrete mixing schedule requires.

Aggregates will come from a quarry on the plateau and be stockpiled over a conveyor tunnel from which they will be moved via a 300-ft drop-shaft to the screening and washing plant on the topmost canyon wall bench and thence to storage bins. The crushing plant and a sand manufacturing plant are also at this level, still more than 200 ft above the base of the mixing plant, which is at the elevation of the top of the dam.

TRETOL

E-POXTITE

the miracle concrete welding and patching material...

There's no doubt about it, E-POXTITE is the most remarkable new development in surface finishes in years. It features amazing strength . . . it's resistant to chemicals, acids, alkalis, even extreme wear.

E-POXTITE is the ideal material for welding new concrete to old, bonding, welding new or old concrete to wood, metal or plastic. It's thermo-setting. Outlasts other conventional surface finishes.

E-POXTITE Weld and Paste is a specially developed two component epoxy resin material manufactured with Thiokol Polysulfide Liquid Polymers. When the two components are mixed, a chemical reaction occurs that changes this liquid-like material into an inert solid with tremendous adhesion and strength.

When repairing holes and cracks of considerable size, or resurfacing large floor areas, just mix E-POXTITE Paste with graded aggregate filler and finish, using standard methods.

For a longer lasting, trouble-free patching material, E-POXTITE will do the job for you — and do it better and more economical.

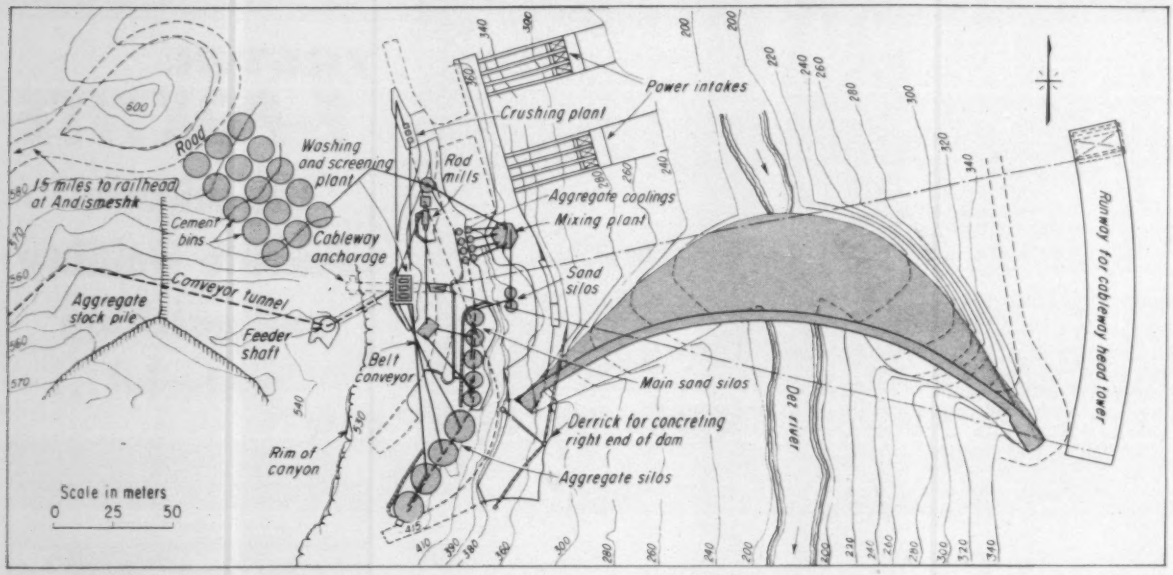
Call or write for the name of your nearest Tretol distributor. Why not do it today!

TRETOL INC.

DIVISION OF SERVICISED PRODUCTS CORP.

—Quality Products for Concrete and Masonry

6051 W. 65th St., Chicago 38, Illinois



CONCRETING FACILITIES FOR DEZ DAM will be perched high up on the right abutment on man-made benches. It's 210 meters (700 ft) from the mixing plant at elevation of the top of the dam up to the cement bins and aggregate storage.

All of this canyon wall benching work has been dangerous and exacting. Rock slides and breakoffs of overhangs have occurred despite precautions to avoid them, and some fatalities have resulted. Nevertheless, the work has steadily progressed since it was begun a year ago, and there is confidence that the first concrete will be placed in the foundation of the dam next May, as scheduled.

• **Design of the dam**—The dam for which these preparations are being made is a notable structure with some interesting design aspects. Following Italian practice, it consists of a base course or load distribution saddle, called a pulvino, along the bottom and walls of the canyon on which the main shell of the dam bears through a perimetral joint. In the bottom of the canyon this saddle attains a thickness of about 50 ft, which reduces the height of the dome shell for design purposes to about 580 ft. The dam is divided into 17 radial blocks for construction purposes, and it is contemplated that concreting will be done in 10-ft lifts.

Although the designers have expressed the utmost confidence in the foundation rock, based on tests and the extensive experience that the tunneling operations afforded, an international consulting board appointed by the World Bank is less certain of some of its qualities. In any event, as a precaution against the possibility that some parts of the conglomerate are weakly cemented and therefore permeable, and that the rock contains areas where compression and shear strengths may be unduly low, the board recommended that extra conservatism be used in making the design.

As a consequence, it is likely that deeper abutment keyways than originally contemplated will be used and that the radii of the arches will be increased to produce a flatter arch whose line of thrust will be more nearly normal to the canyon walls. One criterion is that the minimum distance from the surface of the canyon walls to the abutment foundations should be at least 30 ft.

It is also possible that the thickness of the arch at the crown will be increased to resist any increase in stresses in this region caused by plastic yielding of the abutments. The modulus of elasticity of the rock is low compared to that of concrete, so that this problem of abutment yielding is still under study.

Indicative of the careful testing of the rock that has been undertaken, not only have thirty-six 12-in. cubes been sent to Italy for triaxial load tests, but extensive on-site testing has been done. This has included the use of "flat jacks," which are inflatable devices inserted between closely spaced rock faces, and the use of ordinary jacks between the roof and floor of a tunnel to measure the modulus of elasticity of the rock. Also to measure the elasticity of the rock, a hydrostatic test was conducted in a 5-ft-dia tunnel equipped with bulkheads 15 ft apart; the spreading of these bulkheads was measured sonically on a wire stretched between them.

As to the danger of permeability, additional studies of the grouting program are also being undertaken. Consolidation grouting of the entire foundation may have to go as deep as 50 ft. Curtain grouting will be carried out from a gallery in the pulvino, but the possibility of supplementing this by abutment grouting from tunnels at various levels is being investigated. Such abutment grouting may have to penetrate 350 ft into the left abutment and even deeper in the vicinity of the powerhouse in the right abutment.

Another facet of design interest on the Dez project appears in the spillway tunnels. Not only are these large by any standard, they contain right-angle bends between which the water drops 350 ft vertically in one and 250 ft in the other. The quality and thickness of a concrete lining for such service is a matter of extreme importance on which further studies are under way.

The designer of Dez Dam is Electroconsult of Milan, Italy, which made extensive use of model tests conducted at the Instituto Sperimentale Modelli e Strutture (ISMES) in Bergamo, Italy. All of the design work was supervised by a consulting board consisting of A. A. Meyer of the Development and Resources Corp., (DRC), Carlo Semenza, manager of hydraulic construction for the Societa Adriatica di Elettricita and Guido Oberti, director of ISMES. The design of the power facilities is handled by DRC, and hydraulic design and model testing of the spillways was carried out at the Georgia Institute of Technology. Project engineer at Dez Dam for DRC is Gordon L. Williams, whose last job was terminated by the revolution in Iraq, where he had been project engineer for Harza Engineering Co. on Derbendi Khan Dam.

When you talk **tough construction jobs** ... you talk **Mack's language**

. . . *that's why*

THE BIG JOBS GO BETTER WITH MACKS

Whether you're building an expressway or hauling rock, digging out the bed for a skyscraper or moving a mountain . . . if it's the kind of job that means hauling heavy loads at a profit, it's the kind of job for a Mack.

Take a look around any big construction job and you'll notice this: The tougher the job, the more you'll see Macks. There are plenty of good reasons for using them. For instance, Mack makes trucks that get jobs done on time . . . not just when new, but long after even other so-called heavy-duty vehicles have outlived their usefulness. Not just when the going is good, but under all operating conditions.

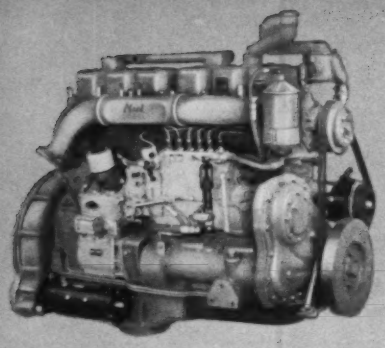
But most important, Mack truck dependability pays off in profitable, lowest-cost operation, regardless of initial price.

Mack vehicles—with rated gross capacities from 26,000 to 200,000 lbs.—are built for enduring performance. Mack-built Thermodyne® gasoline or diesel engines range from 170 hp to 225 hp and deliver maximum torque at low r.p.m. Famous Mack transmissions—five to twenty speed ranges—have ideally spaced ratios to give drivers smooth, effortless control through all speeds. Mack-engineered steering systems, providing sharp turning angles and easy handling characteristics, enable Macks to maneuver faster, squeeze in extra trips per shift. Mack's unique Balanced Bogie with PowerDivider four-wheel, rear-axle drive delivers a bias of power to the wheels with traction. These and many more features make Macks the performance and economy leaders of the industry.

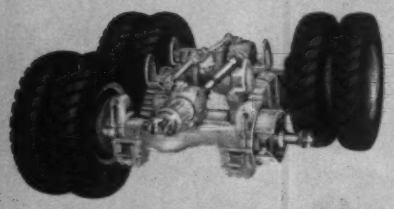
MACK

FIRST NAME FOR

TRUCKS

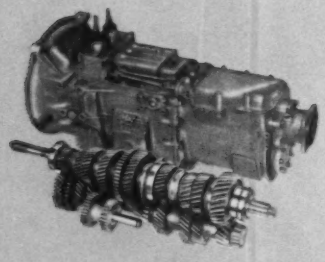


MADE BY **MACK**



MADE BY **MACK**

MADE BY **MACK**



MADE BY **MACK**

MADE BY **MACK**

MADE BY **MACK**

MACK STANDS FOR

UNDIVIDED RESPONSIBILITY

You get Undivided Responsibility when you buy a Mack. Undivided because Mack practices Balanced Design—building far more of its vital truck components than any other truck maker in the heavy-duty field.

But what of other manufacturers? Without exception they buy many or all of their major components from outside vendors . . . engines, clutches, transmissions, front and rear axles, and drives.

Too often this means split responsibility. Who guarantees the component? Who provides the service on it? Sometimes the truck manufacturer . . . sometimes the component manufacturer.

Is this good? Mack feels it is not. When you purchase a Mack you must receive unqualified satisfaction. To insure this satisfaction, Mack insists on building most of its vital components. In this way Mack not only controls the quality of its components, but it can be sure its components will work in harmony . . . as an integrated unit.

You cannot have Balanced Design with mass produced parts—parts built to the lowest common denominator of a broad area of manufacturers. For instance, how can the same transmission fit equally well behind a gasoline engine of 400 cu. in. displacement and a diesel engine with a displacement of over 700 cu. in.? It can't—not with such a wide difference in torque output. All you can have is a lower level of standardization. And why pay a difference of a thousand dollars or more when the vital components of the highest priced competitive makes are identical in quality, construction, design and manufacture to the vital components of the lowest priced makes. Peel off the skin and they all look the same.

Not so with Mack and that's why we can assume Undivided Responsibility. We built it and we stand behind it—100%. Who else can say the same?

Mack Trucks, Inc., Plainfield, New Jersey. Mack Trucks of Canada, Ltd., Toronto, Ontario.

MACK for over 6 straight years **NO. 1** by far in sales of diesel trucks

IT'S PART OF THE LANGUAGE . . . BUILT LIKE A **Mack**

8083

Printed in U.S.A.

Wide Top Cut Features Slab Joints

The contractor has completed sawing and sealing more than 27,000 ft of "wide top" contraction joints in concrete pavements at Cecil Naval Air Station, Jacksonville, Fla.

Pavement Specialists Industries of Kansas City, Mo., designed and installed the joints, which are said to be more economical and to perform better than the conventional type of sawed joints.

The joint is sawed in two stages. First cut is made, when the concrete is "green", to a depth of 1 in., ⅜-in. wide. This cut usually can be made with low-cost abrasive blades. After initial curing of the concrete, a second pass is made to cut a narrow groove to full specified depth. A narrow diamond or abrasive blade is used.

After the second cut has been made, workmen insert a length of plastic or rubber tubing, jute rope, or similar material into the top of the joint. Later, the tubing is pushed to the bottom of the wide top groove and sealing compound placed over it.

Principal purpose of the tubing is to serve as a water stop, in event that the sealant develops holes or cracks during the service life of the pavement. The insert also retards the gradual movement of the sealing compound down through the joint.

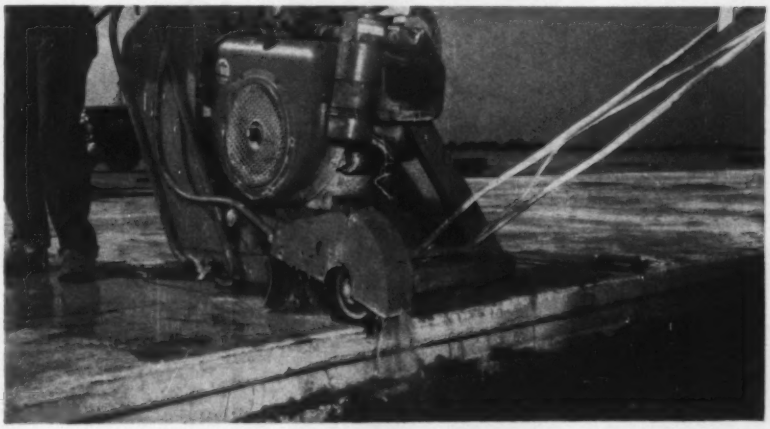
Placing the insert in the top of the joint immediately after sawing retards rapid moisture loss in the concrete around the joint, prevents infiltration of foreign material into the joint prior to sealing, and eliminates the need of masking the joint when membrane curing compound is used.

The insert aids in removal of the sealant when the joint must be resealed. A pointed plow bit run under the insert will lift out the insert and old sealant in long lengths.

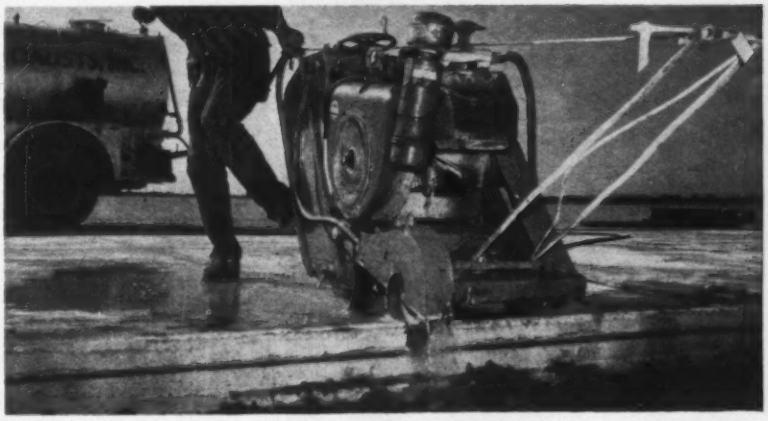
Principal advantage of the wide-top joint is said to be a better "shape factor" for the sealant. The decreased depth and proportionately greater width are intended to increase the ability of the sealer to elongate and contract to accommodate seasonal changes in joint width and to minimize adhesion failures.

It is reported that the wide-top joint requires less sealing compound per foot of joint than some other types of sawed joints.

The Bureau of Yards and Docks included the wide-top joint as an alternate when bids were taken on repairs to concrete aprons at Cecil Field last summer. Prime contractor for the work was Duval Engineering and Contracting Co. of Jacksonville.

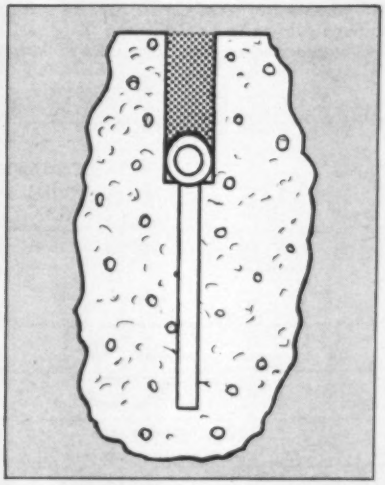


TOP CUT for wide-top joint is ⅜ in. wide, 1 in. deep. Made when the concrete is "green," this cut usually can be made with abrasive blades.



SECOND CUT is narrow and extends to full specified depth; it can be made with a narrow diamond or abrasive blade.

TUBE is inserted in top of joint to serve as water stop and retain sealant.



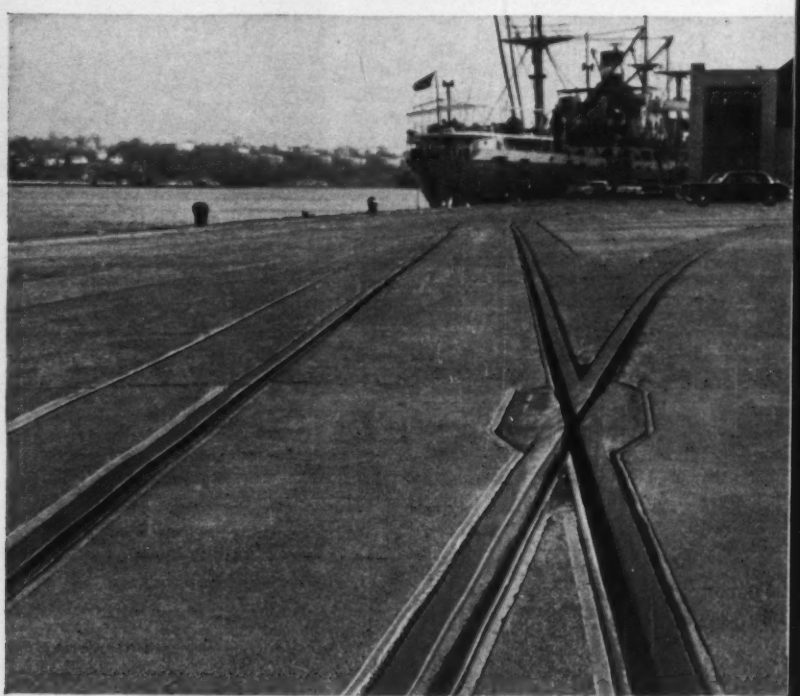
CROSS SECTION of joint, which is said to have better "shape factor" for sealant.

Special to Engineers in

PORT DESIGN

Bethlehem girder rail detail and alignment plans

This complicated bit of Girder Rail trackwork gets thorough going-over by Bethlehem inspector at our Steelton plant before being torn down for shipment.



Here, Bethlehem Girder Rail and Girder Guard Rail were laid in conventional manner over wood crossties, with tie plates and standard railroad spikes. Note how built-in flangeway at rail head retains paving.

Steel

for Strength
. . . Economy
. . . Versatility

Bethlehem furnishes tongue switches and mates, shown here being installed, along with all necessary accessories.

will help you design the most efficient pier trackage

Bethlehem Girder Rail was especially designed for use in pavement track installations. Its companion section, Bethlehem Girder Guard Rail, should be installed opposite frogs and on sharp curves. Girder Rail can be spiked down over tie plates and wood crossties, or, in some cases, held down with anchor bolts, rail clips, and tie plates.

No Need to Construct Flangeways

Unlike tee rail, you don't need to construct flangeways alongside the railhead, because Girder Rail has its own flangeway built right in. This greatly simplifies installation, reduces costs, and makes for a smoother-running, more efficient track system.

Produced in Two Rail Sections

Bethlehem produces two girder rail sections (7 in. and 9 in.), to the standards of the ASTM. These are: Section 404, 128 RE 7A Girder, with Girder Guard Rail Section 416, 149 RE 7A; and Section 408, 159 RE 9A Girder, with Girder Guard Rail Section 409, 174 RE 9A. Turnouts and other necessary components are available for use in girder rail trackwork.

We Do All Fabricating

All Bethlehem Girder Rail Sections have an integral paving guard to create a flangeway and to protect the paving from chipping and spalling. Bethlehem is equipped to do all fabricating right in our Steelton, Pa., plant, as well as engineering, fitting, aligning, and match-marking of all pieces before shipment to the job-site.

Our new portfolio contains helpful data on turnouts, frogs, tongue switches and mates, tie plates, clips and other pertinent accessories. It can prove invaluable to you in your design work. And we'll gladly back it up with on-the-spot engineering assistance.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY
Room 1041, Bethlehem, Pa.

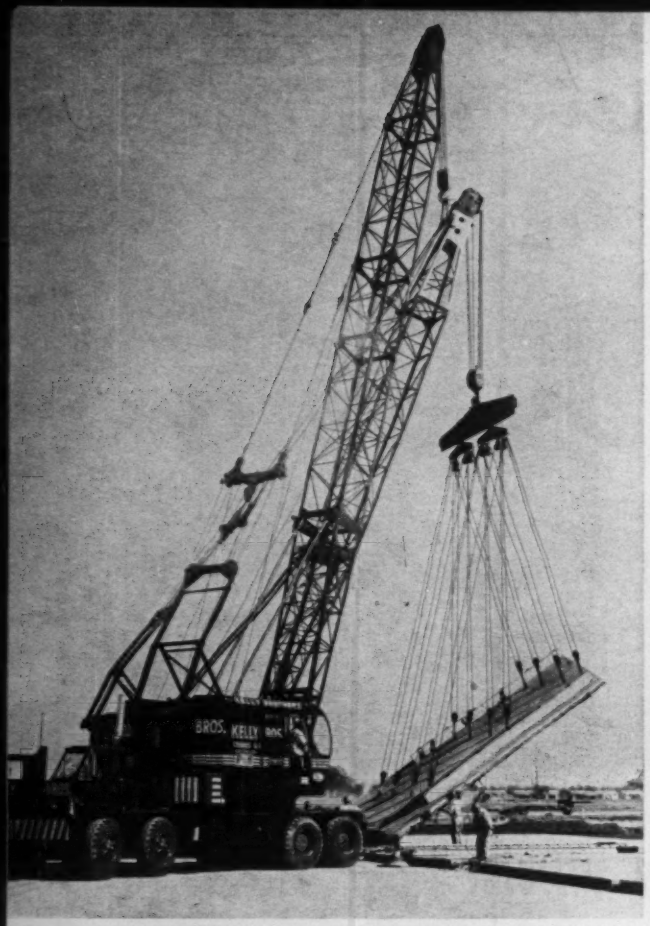
Please send me_____copies of your Girder Rail Detail Portfolio.

Name_____

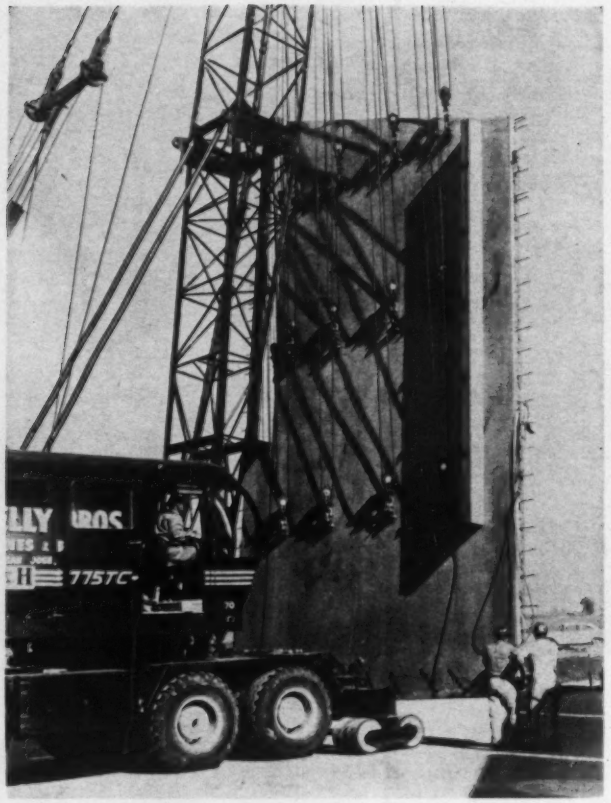
Firm_____

Address_____

City & State_____



TWO CRANES tilt up a 45-ton precast panel for a building at Davis, Calif. One crane lifts the boom tip of the other.



ONE CRANE moves the panel to the building. Only one crane is needed after the panel is near vertical.

Cranes Team to Lift Heavy Panels

Precast panels that rank among the heaviest lifted have been erected for a California food plant; some of the wall panels weighing as much as 45 tons. Two heavy truck cranes teamed to make the lifts, working through 12 pickup points.

The project centers on a 313,000-sq-ft food-processing building for Hunt Foods & Industries, Inc., at Davis, Calif. The job included 128 panels 8 in. thick and up to 42¼ ft high. The method of pickup and arrangement of pickup points was devised by the general contractor on the job—Associated Construction & Engineering Co. of South San Francisco, Calif. Rigging and lifting work was done by Kelly Bros. of San Jose, Calif.

Kelly Bros. used two heavy-duty truck cranes that, with outriggers and rigging are each capable of making 80-ton lifts at high boom. To raise the highest panels, the two cranes were teamed for the initial lift. But instead of both working on the same spreader beam, the 80-ft boom of one crane was attached to the tip of the 70-ft boom of the other crane. Once the panels were hoisted to vertical position, one crane was removed and the other was able to walk the panel into position.

Lifting stress was spread through the panels by means of 12 separate pickup points. Four slings were used for the big panels—each sling had 183 ft of ¾-in. cable. Each end of a sling was tied off at an equalizer bar and passed through sheaves at each of three pickup points and sheaves on the equalizer bar. Two small equalizer bars were mounted on one large equalizer beam—this arrangement assured equal load at all 12 pickup points.

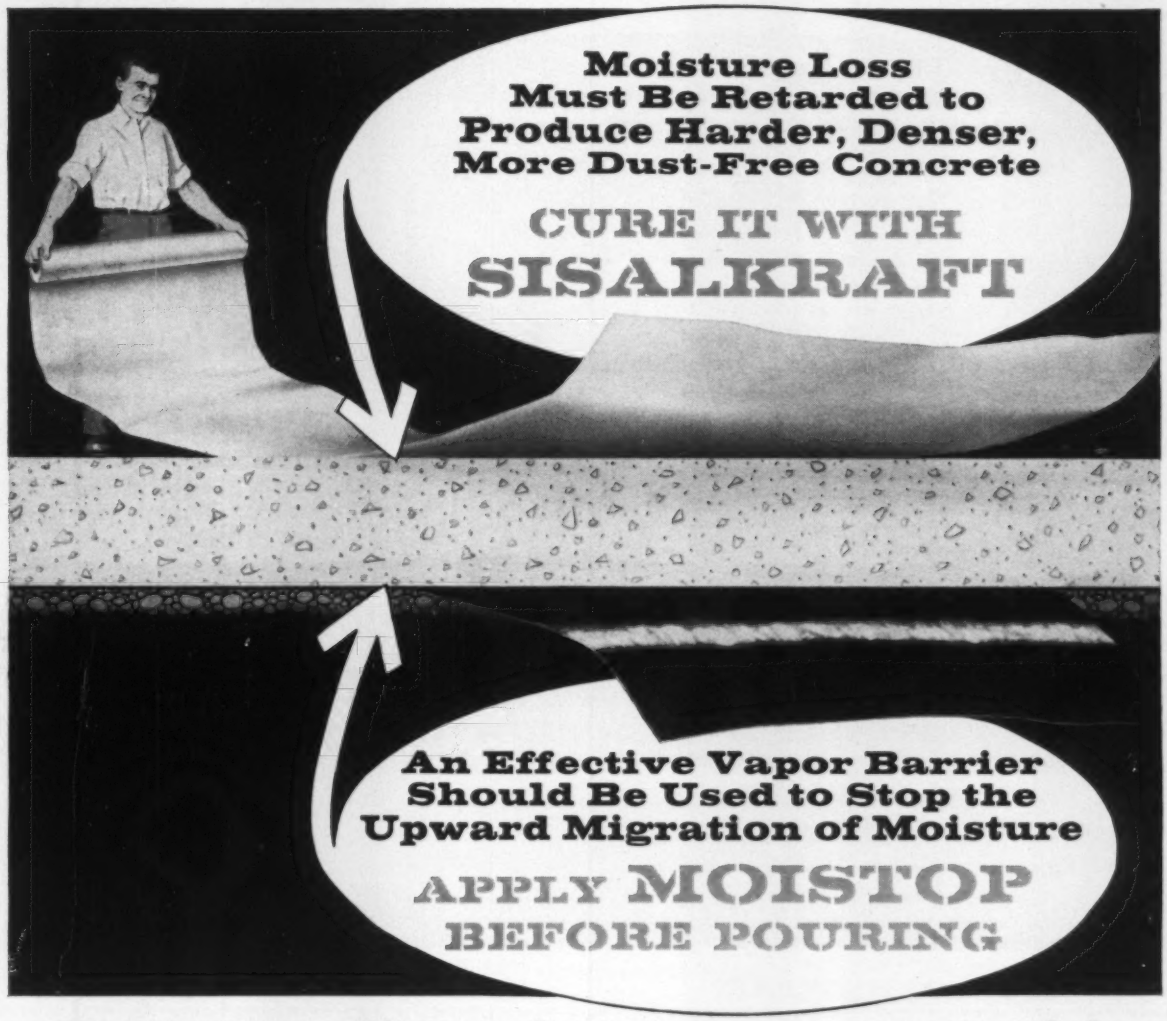
Each pickup point was equipped with inserts capable of resisting 16,000-lb tension and 12,000 lb in shear.

Panels of irregular shape were strengthened by timber strongbacks. Lumber used was on the job for the plant roof structure. These strongbacks were bolted to the panels without cutting the timber. Some strongbacks were 6x10-in. beams and others were groups of 2-in. joist material. Strengthening the panels in this manner was considered cheaper than adding reinforcing steel.

After the panels were in position, they were braced by pairs of ⅞-in. cables on each side. These braces were left in place until the roof system was completed. The cables were equipped with ½x18-in. turnbuckles to take up slack. And they were attached either to the concrete floor or to concrete dead men, buried 6 ft deep for exterior cable braces. In addition, timber braces with fittings to the panel insets and floor slab held some panels.

The building was designed by John Fortune, architect, and William Porush, structural engineer, both are located in Los Angeles.

The lifting system was developed by Howard A. York, chief engineer, Associated Construction & Engineering Co. The work was supervised by Bob McGinnis, project manager, Oscar Washam, general superintendent, and Dave Hall, superintendent.



These two quality products warrant your careful consideration for most concrete floor construction

MOISTOP — A combination of fungicide-treated reinforced paper laminated to polyethylene film with a perm rating of 0.15, Moistop is a *permanent* barrier against transfer of moisture vapor. Applied over fill before pouring, its strength will resist tearing, puncturing and abrasion from workmen and equipment. Wide widths mean faster application with minimum lapping.

SISALKRAFT — Tough reinforced paper of 101 uses. This product will prevent rapid drying of newly poured concrete. It is also an excellent protective cover for the slab during subsequent construction — keeping debris, mortar, etc., from damaging or marring the floor. The durability of Sisalkraft permits re-use, bringing its low cost per square foot down even more.

Moistop and Sisalkraft comply with FHA Minimum Property Standards for the uses recommended.
Literature and samples on either or both products will be sent promptly upon request.

ROLL SIZES

MOISTOP — 72", 84", 96" containing 1200 sq. ft.
SISALKRAFT — Widths from 36" to 96", special rolls up to 26½'.

reinforced paper, foil, plastics & other products for construction, industrial packaging & agriculture

American Sisalkraft Company
DIVISION OF ST. REGIS PAPER COMPANY
Chicago 6 • New York 17 • San Francisco 5 • In Canada: Murray-Brantford Ltd. in principal cities

OLD FIRE HYDRANTS

STILL DOING 24-HOUR DUTY

IN CAMDEN, N.J.

The Camden, N.J., Water Department was formed in 1845, when James K. Polk was president. A small building was erected at the foot of Cooper Street to house the pumping station. Water mains were installed and approximately 15 years later, R. D. Wood Hydrants were tied in. Since those days Camden has grown from a community of 6500 people to a modern industrial city of 125,000. All utilities have been changed beyond recognition . . . except for a number of the original R. D. Wood Hydrants that are still in service. Conditions have changed, but the reliability built into those hydrants makes them just as effective now as they were over 100 years ago.

Like all R. D. Wood Hydrants, the oldtimers are of simple but sound construction; their operation cannot be impaired by foul weather, snow, sleet, ice or silt. Apart from the hazard of being in the path of a truck out of control or the possibility of street relocations, there is no foreseeable trouble ahead for them for many more years. There has never been better fire protection for any community than R. D. Wood Hydrants.

Conform to A.W.W.A. specifications

R. D. WOOD COMPANY

Public Ledger Bldg.
Independence Square
Philadelphia 5, Pa.

Established in 1803

Manufacturers of "Sand-Spun" Pipe (centrifugally cast in sand molds)

Trencher Uses Vertical Boom

A new trencher with a boom that enters the ground vertically enables the operator to work flush to walls, curbs and sidewalks. It is called the Century Trenchit.

According to the maker, the unit need not be transported by trailer. It hitches to a car or pick-up by means of hydraulic controls and can be towed safely from job to job at highway speeds. It is self propelled at the job site, at a speed of up to 2½ mph.

All operating functions of the Trenchit are hydraulically controlled. Smooth, easy, simple handling are attributed to the hydraulic controls. Only one man is required to handle the trencher from hitch to ditch.

The manufacturer states that the vertical boom requires less horsepower because it eliminates the reverse force found in conventionally angled digging booms.

Trenchit digs 4 to 12 in. wide at variable, selective depths. CENTURY ENGINEERING CO., WAUKESHA, WIS.

Sprayer Mixes, Applies Laminates

A versatile spraygun that mixes plastic resins with glass fibers and fires the combination onto surfaces under compressed-air power is now available. It can cover surfaces with a glass-fiber laminate, ⅛ in. thick, at costs of about 25 cents per sq ft, according to the manufacturer.

Stored in separate containers, the plastic resins feed into the spraygun and combine at the nozzle before they meet the strands of glass roving in the air stream. The coating hardens in less than an hour, after which a rolling operation completes the application process.

Uses of the spray technique include waterproofing swimming pools, roofs, protecting pipes and tanks from corrosion, and surfacing walls and partitions. SPRAY-BUILT, INC., DEPT. E, 3605 E. 10 COURT, HIALEAH, FLA.

PLASTIC coat is sprayed on.

THE RIGHT MACWHYTE WIRE ROPE & SLING FOR YOU

IS AS NEAR AS YOUR

CALL YOUR MACWHYTE DISTRIBUTOR

ASK ABOUT MACWHYTE'S NEW 7-FLEX® WIRE ROPE

MACWHYTE WIRE ROPE COMPANY
2900 FOURTEENTH AVE.
KENOSHA, WISCONSIN
242

WIRE ROPE MANUFACTURING SPECIALISTS SINCE 1896

GET MORE FOR YOUR MONEY WITH A WARREN-KNIGHT Transit

Model 2cF $775.00

After all, an instrument with a design and construction that assures more work in less time, with reduced maintenance and repair costs, and will probably be considered your "Number one" instrument during your entire remaining Professional career, certainly merits your serious consideration.

10 DAY FREE TRIAL SHOWS WHY

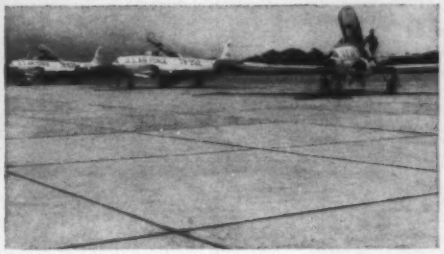
Sturdier Construction, with extra reinforcing for rough handling, means longer life. Close Focus at 4½ feet saves many a set-up. Disappearing Stadia eliminates source of errors in running levels. Right Angle Peepsight through telescope axle permits offsets at close range. Differentiated Size and Slant of figures on limbs and vernier assures accurate reading. Replaceable Leveling Screws reduce maintenance. Non-cramping Leveling Head assures easy handling.

Our 53rd Year

Ask for Bulletin NR-31 that lists full details.

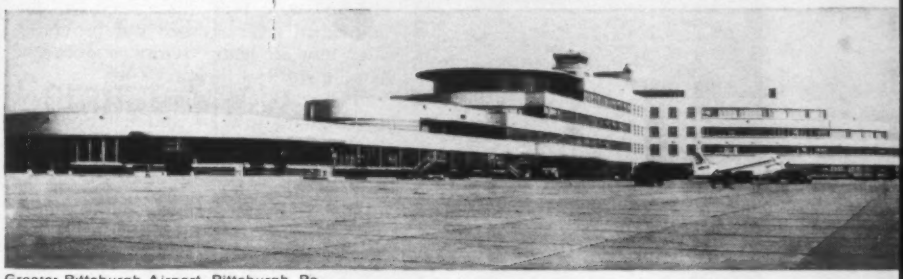
WARREN-KNIGHT
136 N. 12th St., Phila. 7, Pa.

USS Blast Furnace Slag is the aggregate in these jet runways



Youngstown, Ohio Municipal Airport

McGuire Air Force Base, New Jersey



Greater Pittsburgh Airport, Pittsburgh, Pa.

You can't land a jet plane at any port in a storm. You need big, heavy-duty airports with extra long runways. These airports—both commercial and military—are constructed with USS Blast Furnace Slag as the coarse aggregate. ■ Slag is the only aggregate with a multitude of pockets in every piece, pockets that fill with cement to form a tough and lasting bond. Because slag is vesicular, angular in shape and won't polish or wear smooth, slag concrete is skid resistant. In addition to being clean, hard, tough and stable, Blast Furnace Slag is heat resistant. The scorching heat of jet exhausts won't bother slag. And compared to other aggregates, many weighing 50% more per cubic yard, slag builds more runway per ton. ■ Even long hauls are economical with this superior heat- and skid-resistant aggregate. On your next job, investigate USS Blast Furnace Slag and see how it can give you a better job at lower cost. Just call or write United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. *USS is a registered trademark*

United States Steel

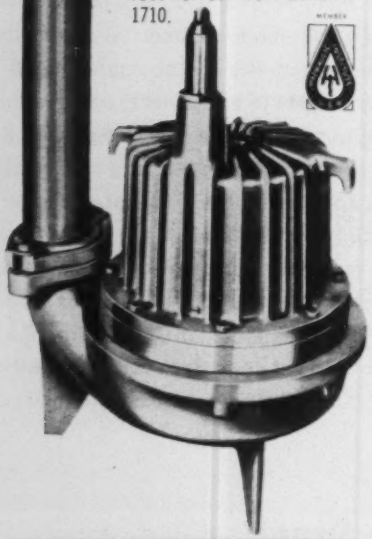
for dependable, 'round-the-clock service . . .

WEINMAN immersible non-clog pumps

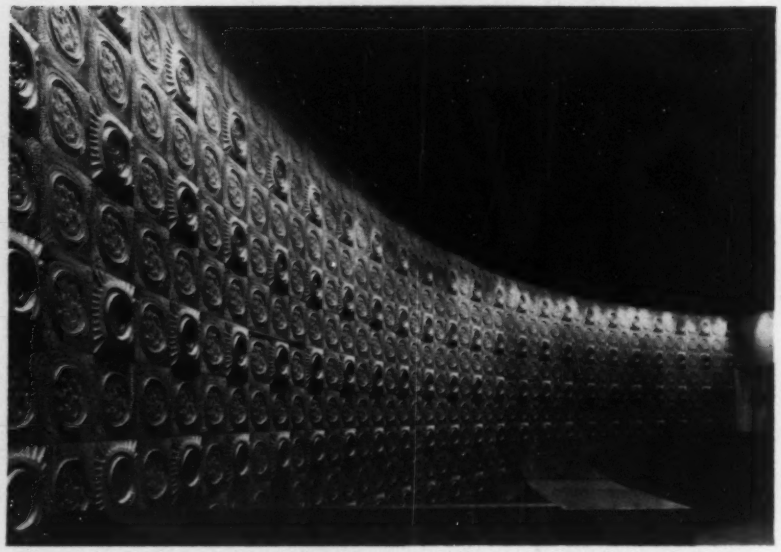
Weinman Type M Immersible Pumps handle sewage, drainage water and industrial wastes fast and efficiently . . . 24 hours a day . . . with little maintenance. Perfect for permanent installation or portable "trouble-shooting" units; quick and easy to dismantle, move and install. Permanent simplex and duplex pump installations furnished with sumps and sump covers.

Simple design, with non-clog impeller, makes maintenance easy; rugged cast iron casing resists corrosion and gives maximum protection in liquids up to 104°F. (Hotter liquids handled under special conditions.) Available with accessories for automatic pump control.

Whatever your pumping problem . . . there's a Weinman-designed pump to meet your precise requirements. Call your Weinman Pump Specialist, today . . . he's in the Yellow Pages. Or, write direct for our new Bulletin 1710.



WEINMAN PUMP
2190 SPRUCE STREET COLUMBUS 15, OHIO
CENTRIFUGAL SPECIALISTS



Ceramic Tiles Now Mass-Produced

Clay wall tiles that resemble the individual pieces turned out by craftsmen now are being factory produced in large quantities at lower cost.

The colorful ceramics can be used to decorate interior and exterior wall surfaces and as room dividers. They also are being marketed for curtain-wall installations.

The tiles are available in 40 standard patterns. Custom treatments are also available. Costs range from about $3.50 to $7.50 per sq ft.

The tiles are thin—from ¼-in. to 2-in. thickness. An average 18-in.-square panel, ⅜ in. thick, weighs only 4 or 5 lb per sq ft.

Among the innovations that the manufacturer has developed for use of the tile are a curved ceramic interior partition and a louvered wall composed of swiveling tiles mounted on floor-to-ceiling poles. A lighted ceramic wall that is its own source of direct light also is available. The illumination is built into the wall and the light flows through half-concealed openings to highlight the wall texture.

Exterior tiles can be mounted directly on the surface of a wall by a standard tile setter.

Some interior tiles are mounted on plywood panels in the shop and, at the site, are attached to the wall by means of beveled wood strips.

Unglazed tiles are kept clean with silicone; glazed tiles require only water for maintenance, claims the manufacturer. DESIGN-TECHNICS, 7 E. 53RD ST., NEW YORK CITY.

One Man Operates Power Wrench

Wachs' Pow-R-Drive, a portable valve turner weighing 38 lb, can be picked up and handled by one man.

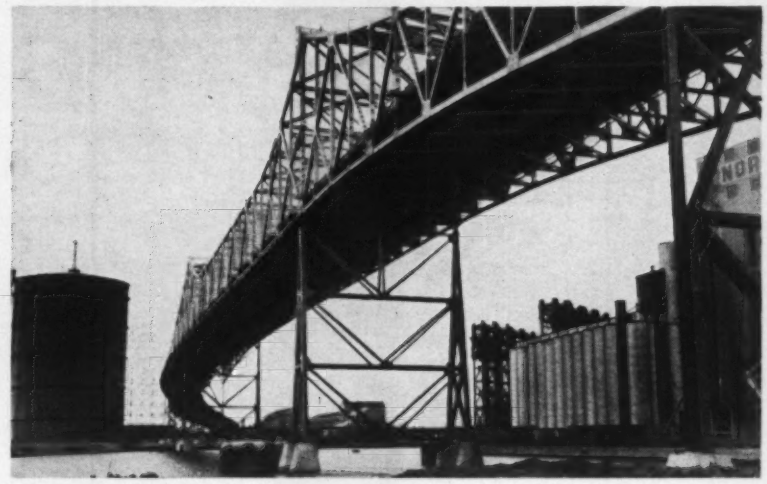
Quick-reverse air or electric motors rotate at 20 rpm in either direction. A long torque arm acts like a wrench to seat valves completely or break them loose. Safety mechanisms on both air and electric drives shut off the machine if it gets away from the operator.

The Pow-R-Drive can also be used to operate hand winches, power geared die heads for threading or cutting, operate sluice gates, drill holes with augers, operate pipe tapping machines and drill anode and post holes. E. H. WACHS CO., 1525 NORTH DAYTON ST., CHICAGO 22, ILL.

HAND-HELD wrench weighs 38 lb.

BYERS GUIDE

Tips on Reducing Corrosion Costs from A. M. Byers Company VOL. 2 NO. 2



Drainage lines on the Calumet Skyway are of Byers 4-D Wrought Iron. Included are 14", 16" and 18" O.D. pipe fabricated from Wrought Iron plate. The use of 4-D will reduce corrosion problems due to sodium chloride and cinders to a minimum.

There are Ways to Combat Snow and Ice on Bridges . . . but

Salt and cinders are often necessary to improve hazardous driving conditions, *but* these two materials also have a detrimental effect. The ice and snow becomes saturated with sodium chloride and acid bearing cinders which are deadly to drainage lines on bridges and overpasses.

The extremely corrosive conditions resulting from salting and cindering virtually "eat up" ordinary pipe, but don't get far with 4-D wrought iron pipe.

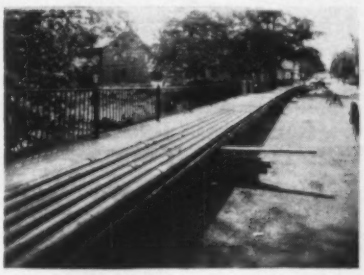
That is one reason why engineers specified nearly 400 tons of 4-D wrought iron for drainage lines for the Calumet Skyway in Chicago, a vital link between the toll road network and Chicago. The specification called for 4-D wrought iron pipe in various sizes as well as 135 tons of 4-D wrought iron plate for 14, 16 and 18 inch O.D. pipe.

The key to wrought iron's corrosion resistance is the iron silicate slag which is threaded throughout the base metal. There is approximately 250,000 of these silicate slag fibers in every square inch of the two component metal. Each fiber serves as a barrier to corrosion. In addition to halting the attack of sodium chloride or acid bearing cinders, 4-D wrought iron resists corrosion caused by alternately wet and dry conditions.

In some states, highway engineers have standardized on wrought iron for such applications as drainage gutters, downspouts, scuppers and curbing. Test results and application reports are available—simply check the coupon.

Under-Water Water Line

Carrying water from a pumping station west of Lake Worth, Florida, to an intercoastal distribution waterway, a 10-inch diameter Byers 4-D Wrought Iron pipe line passes right under Lake Worth. 4-D was chosen because of its superior corrosion resistance, especially in salt water, and also because of the ease with which it can be welded at the site. Since Wrought Iron forms its own protective coating, a tightly adherent layer of oxides, no protective wrap was necessary.



Wrought Iron Conduit Buried in Sidewalk

Conduit to carry power lines to industrial plants in West Hartford, Connecticut, were installed by the Hartford Electric Light Company. Since a new bridge was also a part of the plans, the conduit was to be buried in the bridge sidewalk. Two six-pipe banks of 4-inch threaded and coupled 4-D conduit, totalling 3,200 feet, were used in this installation. Byers 4-D Wrought Iron was selected because of its proven corrosion resistance in applications of this type. Full details are yours for the asking—use the coupon.

A. M. BYERS COMPANY

PIPE PRODUCTS: Wrought Iron • PVC • Steel
ROLLED PRODUCTS: Plates, Billets and Bars • Wrought Iron, Stainless and Alloy Steel

A. M. Byers Company, Clark Building, Pittsburgh 22, Pa.

Please send data on items checked:

☐ DRAIN LINES ☐ CONDUIT ☐ PIPE LINES

Name_____ Title_____

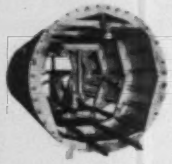
Company_____

Address_____

POSEY WORKS FOR BETTER-

TUNNEL FORMS

Adjustable box forms, non-telescoping round forms for sewerage, water, storm sewers or vehicular tunnels.



For FREE illustrated catalog showing job application, write:

POSEY IRON WORKS INC

Custom Fabrication For Over 50 Years

DIVISIONS:
• Iroquois Asphalt Plants • Mixers and Blenders
• Tunnel Forms • Industrial Heating • Foundry
• Large OD Steel pipe

561 S. PRINCE STREET LANCASTER, PA.

For CIVIL ENGINEERS

THE BRUNTON* POCKET TRANSIT

IT'S HANDY...
weighs only 9 oz.; 2¾" x 3" x 1⅛"; easy to carry in pocket, on belt, in car.

IT'S VERSATILE...
ideal for preliminary and supplementary surveying; used as a compass, transit, level, plumb, alidade, clinometer.
Shows direction to 1°; level, slope or grade within 1°.

IT'S MADE TO LAST A LIFETIME
"Over 60,000 Brunton Transits since 1896"

See your local engineering supply house or WRITE FOR CATALOG

*Brunton is a registered trademark of

WM. AINSWORTH & SONS, INC.
2151 LAWRENCE ST. • DENVER 5, COLORADO

New Product Briefs

• **Lighter dump carries more**—A rear dump body for heavy duty trucks reduces spillage and increases carrying capacity while reducing dead weight, the manufacturer claims. The body, made of T-1 Steel, is said to weigh about half as much as a like-sized body of conventional materials. ATHEY PRODUCTS CORP., 5631 WEST 65TH ST., CHICAGO 38, ILL.

• **Flexible partition**—Acousti-Flex is a flexible room divider made from an acoustical woven fabric containing lead. Designed for classrooms and institutional buildings, it has the appearance of heavy drapery. BRUNSWICK CORP., SCHOOL EQUIPMENT DIV., KALAMAZOO, MICH.

• **Roof deck**—Type A Roof Deck is redesigned for a greater load carrying ability, more positive welding and faster erection, according to the manufacturer. It comes in 18, 20 and 33 ga thickness and in steel sheets up to 28 ft 6 in. INLAND STEEL PRODUCTS CO., BOX 393 MILWAUKEE 1, WIS.

• **Pushbutton tracing**—Trace, a sensitizing solution in a 12-oz spray can, transfers drawings or sketches into an illustration material surface. It gives immediate non-smear copies without darkroom procedures. WEST REPRODUCTION, P.O. BOX 2336, FT. DEARBORN STATION, MICH.

• **Timber adhesive**—Alweld Fire-Resistant Adhesive keeps wood bonded, even when charred to the point of disintegration, says the maker. The adhesive is designed for bonding wooden arches and trusses and is available in 55-gal drums and 5½-gal containers. ALLEN PLASTICS CORP., 1015 EAST 173RD ST., N. Y. 60, N. Y.

• **Mosaic panels**—Sandalite hardboard panels, with colored particles scattered on a neutral background, have a factory-sealed face that produces a hard, stain-resistant surface. They are designed for interior use in wall paneling, wainscoting and partitioning. They are available in thicknesses from ⅛ to ¼ in., and in sizes up to 16 ft in length. FOREST FIBER PRODUCTS CO., P.O. BOX 68, FOREST GROVE, ORE.

• **Durable floor tile**—New Concept floor tile with a binder called "Polymerite" is resistant to grease and oil. It outlasts asphalt tile two to one in durability tests, says the maker. Available in 37 colors, it retails for 15 cents per sq ft. THE MASTIC DIV., THE RUBEROID CO., 500 FIFTH AVE., N. Y., N. Y.

• **Rock bit grinder**—An improved pneumatic rock bit grinder includes heavier bearings, relocated exhaust, and streamlined guards. The manufacturer rates performance of the pneumatic rig the same as the company's ¾-hp heavy-duty electric model. The grinder can be operated by any standard compressor unit and the pneumatic motor provides wide speed variation, according to the maker. BITCO, INC., SPOKANE, WASH.

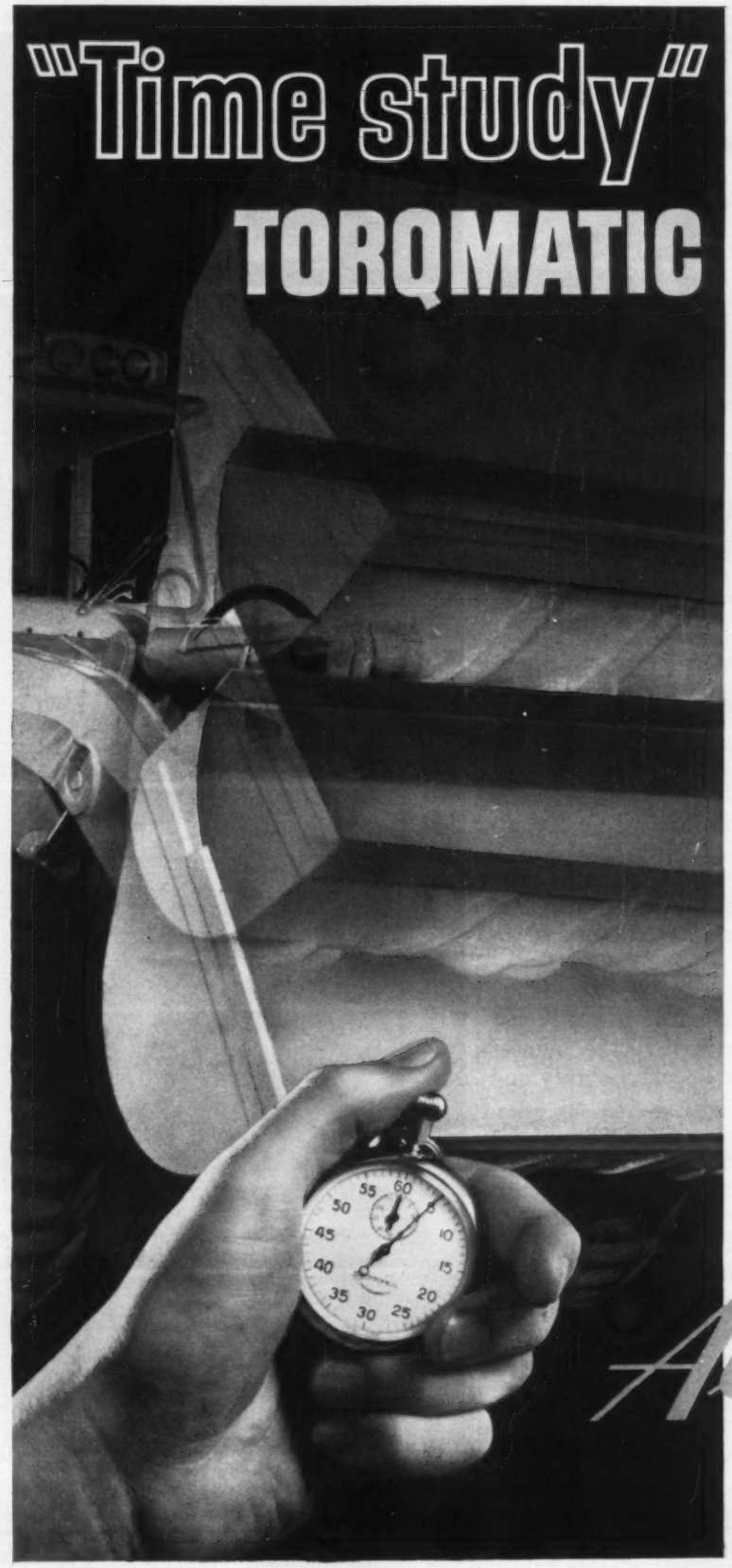
• **New steel**—A new high-strength alloy steel, designated USS "T-1 Type A," is now available in plates and bars from ⅞ to 1 in. thick. In these sizes it has the same 100,000-psi yield strength and weldability as the more expensive USS "T-1" steel, according to the producer. Uses will include bridges, buildings and earth-moving equipment. UNITED STATES STEEL CORP., 120 MONTGOMERY ST., SAN FRANCISCO 6, CALIF.

• **New beam rollings**—Inland Steel Co. will offer seven new beam sections, effective January 1961. Three will be lighter weights in the wide-flange series: 18WF45, 21WF55 and 24-WF68 (ENR Nov. 10, p. 61). Four will be additions to the light-beam series: 14BL22, 14BL26, 16BL26 and 16BL31. INLAND STEEL CO., 30 W. MONROE ST., CHICAGO 3, ILL.

• **Surveying tools**—A line of surveying instruments manufactured by Cooke, Troughton and Simms, Ltd., York, England, is now being marketed by an American distributor of architectural and engineering equipment, CHARLES BRUNING CO., MT. PROSPECT, ILL.

• **Sight-glass**—A new high-pressure, high-temperature sight glass for industry offers a safety range that is maximum from ultra-high vacuum to 30,000 psi pressure. The mounting design of "PresSure" guards against uneven stress and stress failure, according to the manufacturer. "Safelite" lens variations allow its use in acid pressure processes; colored lens discs shield against intense light; non-browning glass is available for radioactive materials. PRESSURE PRODUCTS CO., CHARLESTON, W. VA.

• **Submersible motor**—Submersible ac motors are designed for close-coupling to centrifugal pumps operating in water, oil or liquid chemicals. Sizes range from ½ through 40 hp for operation from polyphase power sources, and from ¾ through 5 hp for single-phase connections. RELIANCE ELECTRIC AND ENGINEERING CO. 24701 EUCLID AVE., CLEVELAND 17, OHIO.



3-SPEED

cuts loader shifting slow-downs

Cut loader shifting slow-downs and you're bound to speed loader job-cycles.

And no loader transmission cuts shifting slow-downs like "Time-Study" TORQMATIC. Reason? It needs only 3 speeds where other hydraulic transmissions need 4 . . . naturally, TORQMATIC-equipped loaders crowd, dig, load and travel faster.

That's just one reason why 9 out of 10 leading loader manufacturers use "Time-Study" TORQMATIC.

More? This single-unit converter-transmission team has fewer hoses to plug, leak or crack . . . has clutches up to twice the diameter of those used in other hydraulic transmissions . . . *is designed to need no major service for two engine overhauls.*

What's more, it's easier and cheaper to repair and maintain. Gears can be replaced in about 4 steps where other hydraulic transmissions need over 20.

It's easy to see why more and more loaders are carrying the TORQMATIC label – why more and more loader buyers are talking TORQMATIC. Want to know more? See your loader dealer or write Allison today.

Allison Division of General Motors
Indianapolis 6, Indiana
In Canada: General Motors Diesel Ltd., London, Ontario

Allison TORQMATIC

TORQMATIC® DRIVES

THE MODERN DRIVE FOR MODERN LOADERS

When performance counts–

PUT YOUR TRUST IN TORRINGTON THRUST BEARINGS

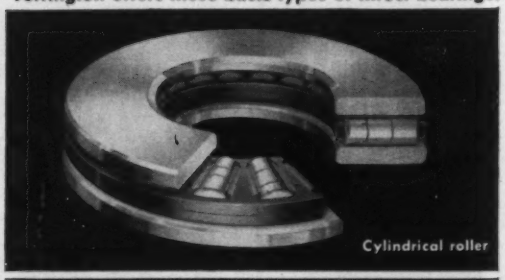
Whatever your performance requirements, there's a Torrington Thrust Bearing precision engineered to meet your needs.

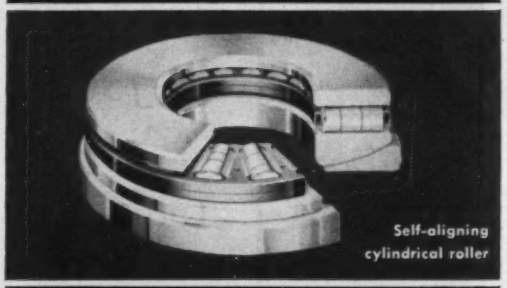
Cylindrical, self-aligning cylindrical, tapered . . . grooved race ball, angular contact ball or needle thrust —all are designed and manufactured to the highest Torrington standards for performance, reliability and long trouble-free service life.

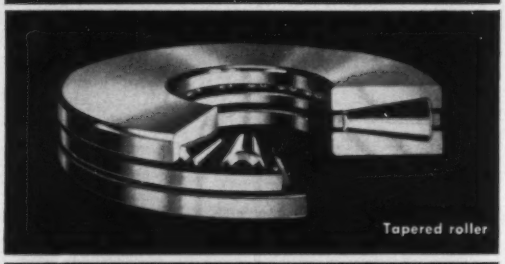
From the smallest to the largest—for power tools or giant radar installations—Torrington Thrust Bearings have the same unmatched precision quality built into every Torrington product. Depending on specific types and applications, they are available with a choice of bronze, steel or phenolic retainers.

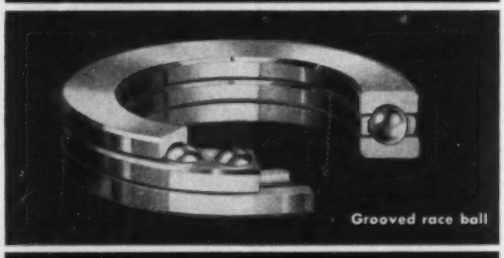
Whether your thrust application calls for a standard bearing or one specially designed to meet unique conditions, you can rely on Torrington for a bearing that's exactly right for the job. Contact Torrington—designers, engineers and manufacturers of every basic type of anti-friction bearing.

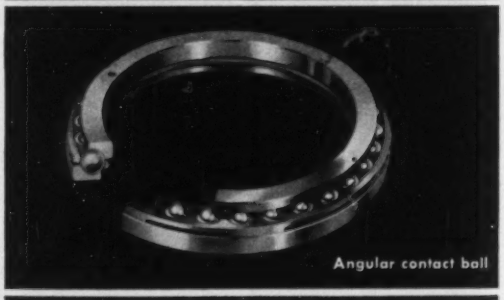
Torrington offers these basic types of thrust bearings.

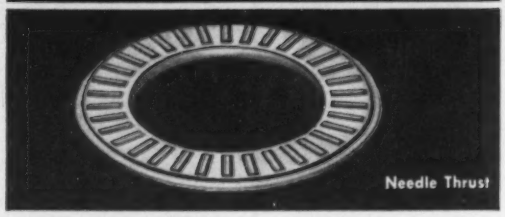

Cylindrical roller


Self-aligning cylindrical roller


Tapered roller


Grooved race ball


Angular contact ball


Needle Thrust

progress through precision

THE TORRINGTON COMPANY

TORRINGTON BEARINGS

South Bend 21, Indiana, Torrington, Conn.

Obituaries

Warren J. Lockwood, 77, former assistant administrator of the Federal Housing Administration. He had joined the FHA in 1943 as chief underwriter of the Newark office and moved through a succession of posts to assistant administrator in 1948. After his retirement from the FHA in 1952, he did consulting work in housing projects and mortgage financing until 1957.

William B. Cheek, 73, retired civil engineer and former manager of the Western Portland Cement Association. Before retirement he was associated with Monolith Cement Co. and was later president and manager of Vol-Scor Aggregate Co.

L. C. Bishop, 75, Wyoming state engineer from 1939 until his retirement in 1957. From 1920 to 1934 he was superintendent of the water division at Douglas, Wyo., and from 1934 to 1939 he was in private engineering.

Robert Beatty, 59, a civil engineer for the Federal Housing and Home Finance Agency in Philadelphia, Pa. Before joining the FHA he was with the Atlantic Refining Co. for 15 years.

William J. Fitzmaurice, Jr., 74, retired chief engineer and vice president of W. W. Lindsay and Co., Philadelphia. He was associated with the Lindsay firm for 42 years.

E. Neil Murphy, 72, retired Pacific Gas and Electric Co. civil engineer. During his 33 years with the company, Mr. Murphy specialized in the design of hydroelectric projects.

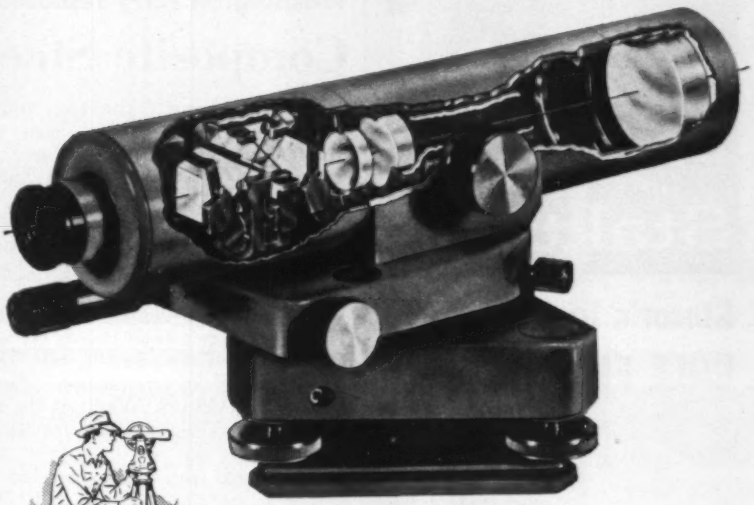
Ralph R. Bushee, 64, chief of Akron, Ohio, sewer department. Before coming to Akron in 1956, he had been with the Chicago Sanitary District.

Charles B. Colpitts, 77, retired transportation analyst. In 1916, he joined Coverdale & Colpitts as a railroad analyst and soon branched out into other forms of transportation. He specialized in reorganization, especially of truck lines.

Henry Slaymaker Cowell, 76, retired consulting engineer of Charlotte, N. C. He formerly was associated with Southern Engineering Company and the W. S. Lee Construction Co.

C. E. Fritch, 53, owner of the C. F. Fritch Construction Co., Dallas, Tex. Mr. Fritch founded the company in 1940 and built many schools and churches in the Dallas area.

Now! BRUNING brings you the famous Cooke Troughton and Simms Surveying Instruments!



On the level, it's twice as fast!

One of the revolutionary surveying instruments in the Cooke Troughton and Simms line—now brought to you by Bruning—is the self-aligning S700 level, shown above. In this unique level, the main spirit level vial is replaced by an exclusive compensating unit, located in the telescope, which keeps the line of sight in a horizontal plane. It is only necessary to level the instrument approximately by means of the circular spirit vial provided. Then, the moving part of the compensator, carrying two reflecting prisms, swings free, maintains itself exactly in a vertical position, and always projects the horizontal ray to the same point on the reticule. Under the most severe conditions, from −50°F to 150°F, the S700 level has provided an accuracy previously attainable only with larger aperture telescopes fitted to precise levels. *In nearly all cases, it has cut leveling time in half!* You owe it to yourself and your company to investigate the revolutionary advantages of this self-aligning level by mailing the coupon below.

BRUNING

Charles Bruning Co., Inc. Dept. 3U
1800 Central Rd., Mt. Prospect, Ill.
Offices in Principal U.S. Cities
In Canada: 103 Church St., Toronto 1, Ont.

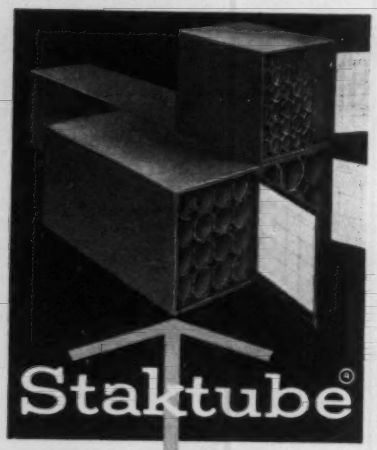
Please send me more information on the revolutionary self-aligning S700 level.

Name _____ Title _____

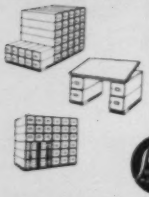
Company _____

Address _____

City _____ Co. _____ State _____



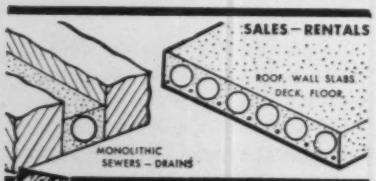
Stacor's lifetime steel
ROLL FILE SYSTEM



"Easy-file easy-find" system to keep rolled prints, plans, maps clean, safe. 32 sizes—8 lengths, 4 tube diameters.

Send NOW for illustrated catalog

STACOR EQUIPMENT CO.
279 Emmet St., Newark, N. J.
Phone: Bigelow 2-6600



NEW! VOIDS IN CONCRETE with ELGOOD INFLATABLE VOID FORMS

REUSABLE RUBBER VOID FORMS FOR SEWERS, SLABS, DRAINS & DUCTS. SUPERSEDES ALL VOID FORMING TECHNIQUES.

- ALL DIAMETERS 3¼" TO 120"
- GUARANTEE MINIMUM OF 100 USES Field experience, 250-3000 uses
- STAFF AVAILABLE FOR SPECIALIZED PROBLEMS

ELGOOD CONCRETE FORMS CORP.
378 TEN EYCK ST., BROOKLYN, N.Y. HY 7-5445

39 REMOTE CONTROLLED HYDRAULIC JACKS & PULLERS
TO CHOOSE FROM
WRITE FOR CAT. H-60

PUMPS AND RAMS (Center hole or solid)
10 TO 300 TONS CAPACITY
Pre-stress concrete; pull gears, sleeves, wheels, etc.; lift, push and pull heavy loads.

SIMPLEX RE-MO-TROL UTIL-A-TROL JACKS JENNY ROL-TOS

TEMPLETON, KENLY & CO. 2553 Gardner Road Broadview, Illinois

Washington ferry replaced by . . .

Composite Steel-Concrete Bridge

A $258,433 composite steel bridge with concrete girders will span the Skagit River at Rockport, Wash. It will replace the ferry that has linked the Rockport-Darrington roadway for the last half century. It will be 504 ft long, 24 ft wide, and have a 3-ft sidewalk on one side.

Croy Construction Co., Bellingham, Wash., took the contract with a bid 15% under the second low of General Construction Corp., Seattle, and 38% below the high of seven bidders. Frank Gilkey, Mt. Vernon, Wash., is the engineer on this highway job for Skagit county.

Croy scored with a lump sum bid for structural carbon steel of $110,000, only $1,000 away from the second lowest unit bid, but $17,000 under General Construction's bid. Similarly, Croy underbid on shoring and cribbing with a price of $26,950. The low was from $5,775 to $63,050 under five of the bidders, and a sizeable 91% short of the second low.

Hourly base wages include: carpenter foreman, $3.775; carpenter, $3.38; structural ironworker, $3.76; and laborers, $3.00.

The bidding included:

1C Croy Const. Co., Bellingham, Wash.	$258,433
2 General Const., Seattle, Wash.	297,285
7 Imperial Const., Seattle, Wash.	356,943
EE Frank Gilkey, Mount Vernon, Wash.	335,000

Bids: 9-26-60 Items	Unit	Quantity	Unit Prices 1C	2
Exc, structure	cy	1,535	$4.00	$2.60
Shoring & cribbing	ls	job	30,000	51,500
Concrete, cl A	cy	385	70.00	83.00
cl F	cy	542	50.00	45.00
cl H	cy	337	40.00	40.00
Steel, reinforcing bars	lb	114,000	0.13	0.14
carbon, structural	ls	job	110,000	127,000
Drains, bri, tp 4-C	ea	8	75.00	100.00
Piling, tmbr, untreated, f	lf	8,700	0.75	0.77
concrete, f, 16" ϕ	lf	600	7.50	5.60
Piles, tmbr, untreated, drive to 10'	ea	174	33.00	37.00
over 10'	ea	6,960	0.10	0.10
concrete, drive, 16" ϕ to 10'	ea	10	100.00	114.00
over 10'	ea	400	0.50	0.25
Metal bri rail	lf	1,010	8.00	7.60
Riprap, heavy loose	t	200	3.00	4.00
Pile, tmbr test, f & drive	ea	2	400.00	300.00
conc test, 16" ϕ, f & drive	ea	1	1,200	700.00

Completion date: 10-4-61
ENR Building Cost Index (1913=100) 20-cities average—562.79
ENR Construction Cost Index (1913=100) 20-cities average—830.92

Mississippi Levee Enlarged, Rebuilt

This $22,788 contract for cutting into a section of levee, pulling out an old water intake line, and enlarging and rebuilding the structure, went to John Riess, New Orleans. This price was 6.3% under the second low placed by Bertucci Bros. Construction Co., New Orleans. The job is for the Corps of Engineers.

Erosion and wavewash protection includes 675 tons of broken concrete or stone riprap and 185 cu yd of shell placed on the riverside. A 6-in. layer of shell will be laid first as a base for the riprap cover.

Wages include: carpenters, $3.25/hr; cement masons, $3.10; laborers, $1.875/hr; and light equipment operators, $2.70.

The bidding included:

1C John Riess, New Orleans, La.	$22,788
2 Bertucci Bros. Const. Co., New Orleans, La.	24,228
4 Monroe J. Wolfe, Metairie, La.	29,998
EE U. S. Corps of Engineers	23,889

Bids: 9-7-60 Items	Unit	Quantity	Unit Prices 1C	2
A—station 10+37.6[a] to 12+11.3[b]				
Exc aggr 9,400 cy, CIP line water intake remove 198 lf of 24" & 70 lf of 20", Bf of exc requiring 10,900 cy embankment & incidental wk, Other items	ls	Job	$14,880	$17,280
B—station 10+00[c] to 12+50[d]				
Aggr embankment for levee enlargement	cy	900	2.350	900.00
Riprap, broken conc or stone	t	675	7.00	8.00
Shell	cy	185	4.50	3.50

a upstream end of exc & bf b downstream end of exc & bf c upstream end of enlargement d downstream end of enlargement

Michigan Dredging Job To Cost $4.3 Million

To improve navigation in the Saginaw Bay and River the Corps of Engineers must move 5½ million yards at $0.49 to $1.02 a yard.. This $4,396,294 contract went to Great Lakes Dock & Dredge Co., Cleveland, low of five bidders, for dredging an entrance channel, river channel, and turning basin.

By placing a low unit bid of 49 cents against the second low of 84 cents a yard for dredging 2,152,600 cu yd of entrance channel in Saginaw Bay and a channel in the Saginaw River to a depth of 24 ft, Great Lakes Dock & Dredge was able to hold its total just 2% under the second low bid by Construction Aggregates Corp., Chicago.

A unit bid of $1.02 for 3,276,000 cy of dredging the turning basin to a depth of 20 ft in the Saginaw at Essexville, Mich., came close to wiping out Great Lake's advantage when the second low bid only 81 cents a yard.

The new channel will be about a mile shorter than the present channel.

Minimum wages include: skilled labor, $3.90/hr; and common, $2.65.

Materials Prices

Monthly Market Quotations By ENR Field Reporters

See following ENR issues for OTHER PRICES:

- Wood Products, Glass, Explosives, Chemicals: Last, Feb. 23; Next, Mar. 23.
- Clay Products, Lime, Plaster, Paint, Roofing: Last, Mar. 2; Next, Mar. 30.
- Wage Rates, Building Board, Lath, Insulation: Last, Mar. 2; Next, Mar. 30.
- Cement, Aggregate, Ready Mixed Concrete, Asphalt: Last, Mar. 9; Next, Apr. 6.

Iron and Steel Products–F. O. B. Warehouse, Per 100 lbs., Base Price

Item	Unit	Atlanta	Baltimore	Birmingham	Boston	Chicago	Cincinnati	Cleveland	Dallas	Denver	Detroit	Kansas City	Los Angeles†‡	Minneapolis	New Orleans	New York	Philadelphia	Pittsburgh	St. Louis	San Francisco	Seattle	Montreal	Toronto
Struct. shapes	Cwt	$.801–8.36EsV	$9.70	$9.00ty	$8.21–9.31KzsV	$7.07–8.34ysV	$7.64–8.91styV	$7.46–8.73tysV	$7.71–9.49MsV	$8.24cK	$7.64–8.91MsV	$9.90sT	$8.70–10.45ktsV	$7.78–8.17ysV	.....	$8.02–8.84Vzs	$7.35–8.40zsV	$7.07–8.34eyV	$7.30–8.57stxyV	$8.43–10.34zsV	$8.60–10.80aDsV	$7.90–8.60CF/8.20–8.90AiF	$9.20H .....
Reinf. bars, new steel	"	8.50	9.00T	8.51–9.94tyV	8.75t	6.75–6.90guV	8.16t‡	6.70et	9.00	9.35	7.37	8.21N	7.35frt	9.26T	$8.00gktz	8.60ty	9.30y	7.35y	7.35/txQ	9.85jS	8.85DM	7.00/7.50FGi	7.50
Reinf. bars, rail steel	"	.....	.....	8.51–9.94tyV	8.75t	6.75–6.90guV	.....	.....	9.00	.....	11.85	.....	.....	9.26T	.....	8.60y	9.30y	.....	7.35/txyQ	.....	.....	7.00/7.50FGi	7.50
Expanded metal lath & std. diamond mesh, 3.4 lb.	"	53.00S	44.50	61.00pK	49.50K	52.00#U	44.50Kg	42.50KL	44.00u	51.17n	67.00 O	51.00	55.00S	44.50K	63.00K	50.00n	45.50#U	58.50#rw	64.00wxK	53.00S	67.00#uD	65.700h	49.50qI
std. ribbed, 3.4 lb.	"	57.00S	49.00	67.00pK	54.00K	63.00#U	48.50mnKg	46.50KL	48.50w	56.35n	74.00 O	55.50	64.00S	49.00K	69.00K	58.00no	50.00#U	64.50#rw	65.00wxK	58.00S	73.50#nD	70.20h	44.85qI

Reinforcing Bar Extras, per cwt, N. Y.—* Quantity (applies to LCL shipments only): under 1,000#, +$1.80; 1000–1999# +$1.50; 2000–4999#, +$1.20; 5000–9999#, +90¢; 10,000–19,999#, +60¢; 20,000–29,999#, +30¢; 30,000–39,999#, +10¢; 40,000# & up, none. * Size†: #2 +$2.50; #3 +$1.40; #4 +$1.00; #5 +70¢; #7, #8, #9, #10, #11 +55¢ * Bending: heavy, +9¢; light +$2.2¢ (except in New York City and surrounding metropolitan area where bending must be done on the job). * Engineering (details and placing from designs by others): over 500 tons, +45¢; 200–499 tons, +55¢ but not over $4500; 75–199 tons, +65¢ but not over $2000; 20–74 tons, +75¢ but not over $975; 5–19 tons, +85¢ but not over $300; under 5 tons, +$1.00 but not over $85. Min. charge $25. Design only: +60¢.

Structural Shape Extras, per cwt, Chicago, Cincinnati, Cleveland, Dallas, Detroit, New York, Philadelphia, St. Louis and Pittsburgh. Item; 10,000# and over, base, 5,000–9,999#, +10¢, 2,000–4,999#, +35¢, 1,000–1,999#, +85¢, 400–999#, +$1.75, 100–399#, +$1.75, under 100#, +$1.75. Order: 20,000# and over, base, 10,000–19,999, +25¢, 5,000–9,999, +65¢, 2,000–4,999, +$1.50, 1,000–1,999, +$2.50, 400–999, +$4.00, under 400, +$8.00. Item extras do not apply in Chicago, Cleveland, Cincinnati, Detroit and St. Louis. *‡ Delivered. *" Aver. of Canadian & American. *†† add 4% sales tax. *a 2000–4999#. *b 10,000–19,999#, fob city. *c 20 tons or over. *d 10,000–29,999#. *e Intermediate struct'l. *f incl. delivery in free zone. *g CL. *h list price; dominion tax exempt; add provincial and municipal taxes. *i add provincial and municipal sales taxes. *j Intermediate and hard grade. *k fob city *l delivered; contractor to do unloading. *m copper alloy. *n LCL. *o asphalt coated. *p 500 sq yd. or more. *q 2.5 lb. *r less 2% disc. for cash. *s 10,000# item in 20,000# order. *t less ½% disc. 10 days. *u add 10¢ switch. *v incl 15¢ del. *w truck lots. *x add 2% sales tax. *y add 15¢ del. *z add 10¢ del. *A American made. *C Canadian made. *D ½% for cash. *E 30,000# or over. *F Federal tax exempt for bldgs. *G add 10¢ del. *H 8.85 without tariff charges. *I 3 lb $60.00. *J 4 lb $47.50. *K less 2% disc. 10 days. *L F.o.b. Youngstown plant. *M 5,000–9,999#. *N 2,000–19,999#. *O 100 sy lots. *Q 5 tons to CL. *R revised. *S less 2% disc. 10th. *T less ½% disc 10th of mo. *U less 2% disc. 10 days. *V varies according to type and size

Iron and Steel Products–Base Mill Prices Carlot Quantities

Item	Unit	Birmingham area	Chicago Area	Pittsburgh	Buffalo area	Cleveland	Youngstown area	Geneva	Los Angeles	Pueblo
Struct. Shapes	cwt	$5.50	$5.50	$5.50	$5.50	.....	.....	$5.50	$6.20	.....
Plate Carbon Steel	"	5.30	5.30	5.30	5.30	.....	.....	5.30	.....	.....
Reinf. Bars (billet)*	"	5.675	5.675	5.675	5.675	$5.675	$5.675	.....	6.375	.....
Rivets, ½" struct.	"	12.25	12.25	12.25	12.25	12.25	.....	.....	.....	.....
Sheet Piling (base)	"	.....	6.50	6.50	6.50	6.50	.....	.....	6.50	.....
Steel Rails, standard	Ton	110.50	110.50	110.50	110.50	.....	.....	.....	.....	.....
light	"	130.00	130.00	130.00	130.00	.....	.....	.....	.....	.....
Track Supplies										
Angle bars	cwt	6.975	6.975	6.975	6.975	.....	.....	.....	.....	$6.975
Std. spikes	"	9.75	9.75	9.75	9.75	.....	9.75	*	9.75	9.75
Tie plates	"	6.60	6.60	6.60	6.60	.....	.....	.....	6.875	6.60
Track bolts	"	.....	.....	14.75	14.75	14.75	.....	.....	.....	.....

* Fairless Works, $5.575.

*WROUGHT STEEL PIPE (Full standard weight) Discount from list; see footnote

Mill	2½ & 3 in.,* Black %	2½ & 3 in.,* Galv. %	3½ to 6 in.,* Black %	3½ to 6 in.,* Galv. %
Lorain, Ohio	13.75	+3.50	+1.75f	+19.50f
Aliquippa, Pa.	13.75	+3.50	3.25a	+14.50a
Sparrows Pt., Md.	17.25	+List	.....	.....
Benwood, W. Va.	13.75	+3.50	.....	.....
Youngstown, O.	13.75	+3.50	3.25	+14.50a
Indiana Harbor, Ind.	12.75	+4.50	2.25ab	+15.50a
Sharon, Pa.	13.75	+2.50	3.25ab	+13.50ab
Wheatland, Pa.	13.75	+3.50	3.25a	+14.50a
Etna, Pa.	13.75	+3.50	50de	.....
Fontana, Calif.	0.75	+16.50b	+9.75ab	+27.50ab

* Threaded and coupled: a 3½ to 4 in. b to 1, 5 and 6 in. c 6 in. d Seamless 5 in.

WROUGHT STEEL PIPE, butt or continuous weld: Deduct (+) or add (–) these "discounts" from or to the following carlot list prices to get mill prices. Price per ft. (based on approx. $200 per net ton): 2½ in., 58½¢; 3 in., 78½¢; 3½ in., 92¢; 4 in., $1.09; 5 in., $1.48; 6 in., $1.92. Add freight for destination price.

WROUGHT IRON PIPE, lap weld: List prices per ft. same as for wrought steel pipe, but add these "discounts" to get Pittsburgh mill price. 2½ to 3 in., black 106%; galv. 139%; 4 to 6 in., black 103%; galv. 133%. Add freight for destination price.

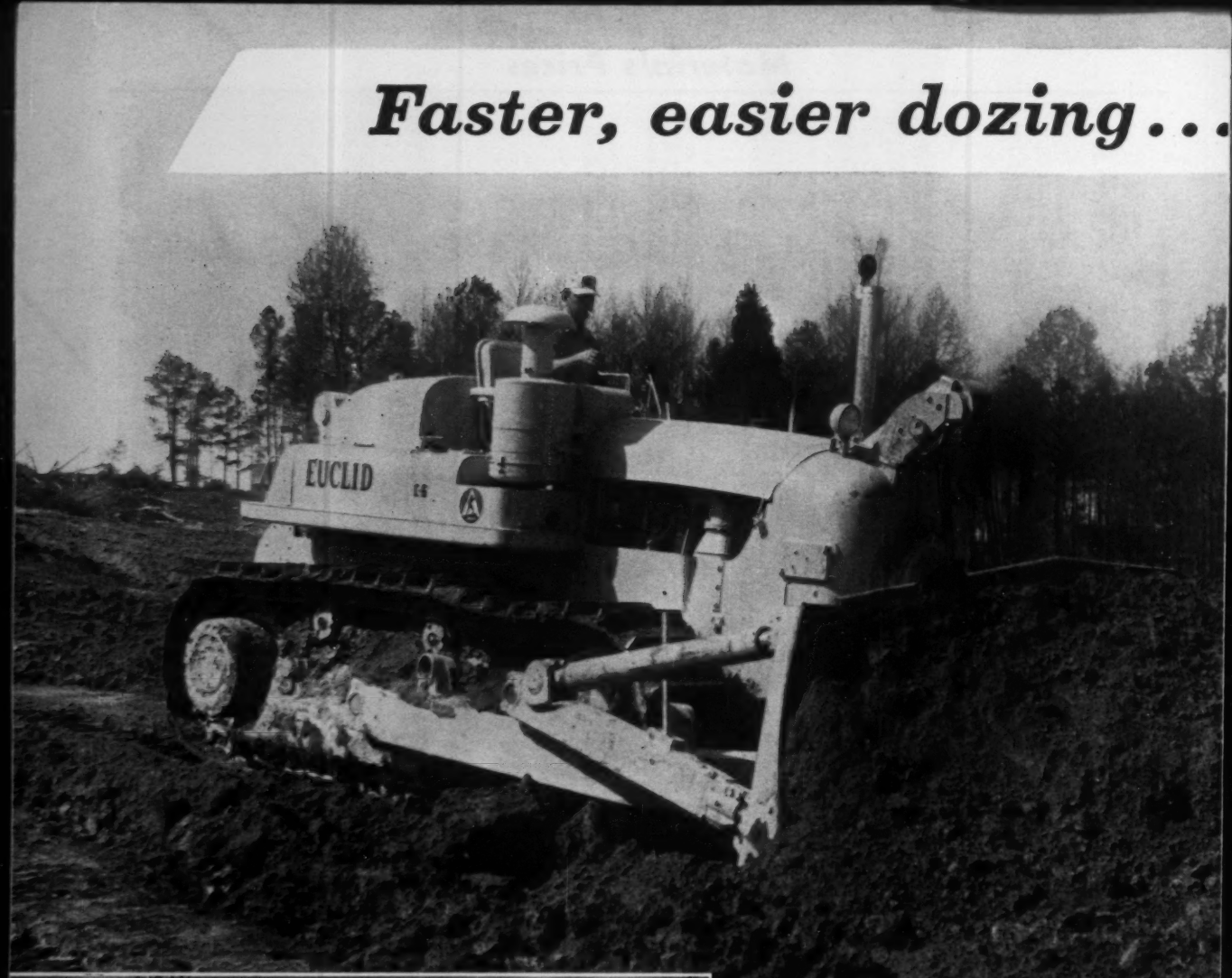
WELDED FABRIC REINFORCING, FOB Joliet, Ill., Donora, Pa., Monessen, Pa. mill, per 100 sq. ft.: 4 x 18 in., No. 5 & 10 wires....$7.04; 4 x 12 in., No. 8 & 12 wires....$2.62; 6 x 8 in., No. 6 & 6 wires....$4.17

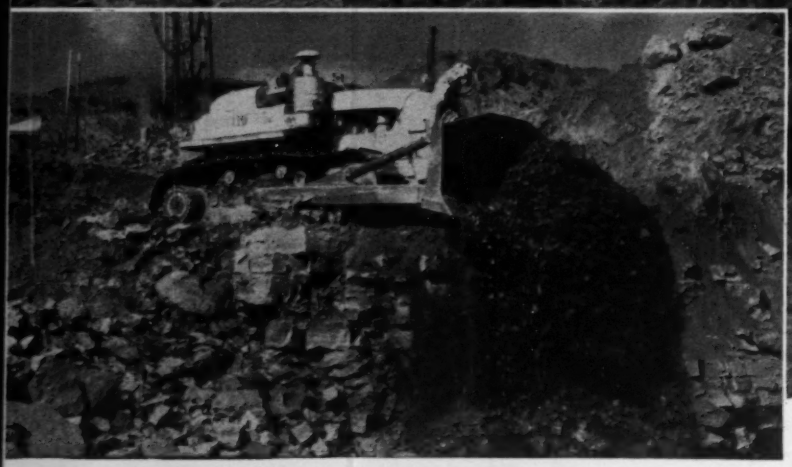
Plumbing, Heating, Water, Sewer Pipe and Tubing

Item	Unit	Atlanta	Baltimore	Birmingham	Boston	Chicago	Cincinnati	Cleveland	Dallas	Denver	Detroit	Kansas City	Los Angeles†‡	Minneapolis	New Orleans	New York	Philadelphia	Pittsburgh	St. Louis	San Francisco	Seattle	Montreal	Toronto
C. I. Pipe Price Index	a	130.6	140.2	125.8	143.2	140.0	135.6	141.8	137.9	145.1	142.1	138.5	148.6	145.0	132.3	138.6	137.8	142.9	135.7	148.6	149.0	.....	.....
Asbest. Cem. Pipe, 6" V	lin. ft.	$1.52	$1.61	$1.61	$1.52	$1.63	$1.48	$1.63	$1.63	$1.71	$1.63	$1.63	$1.67	$1.53	$1.61	$1.63	$1.61	$1.63	$1.48	$1.67	$1.71	.....	.....
6" transite pipe V	" "	1.69	1.69	1.69	1.71	1.69	1.71	1.71	1.71	1.80	1.71	1.71	1.79	1.75	1.69	1.71	1.69	1.71	1.69	1.79	1.80	.....	.....
Asbest. Cem. Pipe, 12" W	" "	2.36	2.19	2.26	2.19	2.19	2.19	2.19	2.26	2.36	2.19	2.26	2.19	2.26	2.26	2.19	2.19	2.19	2.26	2.19	2.19	.....	.....
12" transite pipe W	" "	2.48	2.30	2.37	2.30	2.30	2.30	2.30	2.37	2.48	2.30	2.37	2.30	2.37	2.37	2.30	2.30	2.30	2.37	2.30	2.30	.....	.....
Clay Sewer Pipe 8 in. ASTMC 13-55	ft.‡	0.58r	0.665	0.50r	0.84qrtL	0.93rm	0.56t	0.66BCN	0.575#B	0.56nr	0.97nk	0.62r	0.82bl	1.05oB	0.566r	0.94	0.72	0.66K	0.62r	0.86#d	0.88bk	1.13u	0.76F
12 in. " "	"	1.14r	1.20	0.95r	1.55qrtL	1.78rm	1.11t	1.27tBC	1.09#B	1.00nr	1.86nk	1.125r	1.78blS	1.90oB	1.078r	1.76	1.40#	1.27K	1.23r	1.86#d	1.86kb	2.00u	1.43F
24 in. ASTMC 200-55T	"	4.88r	3.05	4.14rw	6.39qrtM	7.52rm	4.50t	8.47tBC	4.75#B	4.98r	7.48nk	6.324br	7.19blS	8.00oB	5.65r	12.89	9.02#v	4.95K	5.10r	7.53#d	7.61k	7.00u	5.70F
36 in. " "	"	12.00r	12.71	13.50rw	.....	21.16rm	13.22	23.45tBC	10.53#bB	.....	19.95nk	16.86r	16.90blS	.....	.....	35.61	24.68#v	12.92K	12.95rS	18.00#d	.....	13.50u	.....
Clay Drain Tile 6 in. V	M ft.	200.00nr	187.80	295.00rx	244.00r	220.00Br	177.50	179.40mBC	.....	460.00nr	212.00mk	315.00r	410.00blS	.....	240.50pr	240.81	220.00#	190.00	200.00r	360.00#l	260.00ck	288.00	175.00F
8 in. V	M ft.	.....	289.20	430.00rx	348.60r	330.00Br	274.60	276.60mBC	.....	640.00nr	327.00mk	625.00r	590.00blS	.....	566.00	369.84	330.00#	295.00	350.00r	620.00#l	.....	545.00	290.00F
Concrete Sewer Pipe, 12"	ft.#U	0.95mKr	1.01	1.75rS	1.56S	1.30	0.85rA	1.35	1.27BD	1.05m	1.40k	1.70r	L.30vE	2.19DFH	1.41ilR	1.50#B	1.50#h	1.66DB	1.75i	1.05#Q	1.90ky	1.17D	1.27F
24 in.	ft.#U	3.75mKr	2.75	2.75rS	3.60S	4.00	3.25rA	2.40P	2.95BD	3.50m	5.23k	4.25r	3.85fvE	6.31DFH	3.76il	3.60#B	4.00#h	3.93DB	4.05	3.30#Q	4.50ky	3.11jpD	5.19F
Copper Water Tubing 3/8", Type L.	ft.	0.1510	.....	0.1700	0.1480	0.1510	0.1680	0.1480	.....	0.1680	0.1588	0.1310	0.1480	0.1680	0.1680	0.1480	0.1510	.....	0.1480	0.1723	0.1480	0.2089U	0.3063U
½", Type L.	"	0.1700	.....	0.1900	0.1670	0.1700	0.1900	0.1670	.....	0.1900	0.2210	0.1480	0.1670	0.1900	0.1900	0.1670	0.1700	.....	0.1670	0.2418	0.1670	0.2450U	0.3418U

*† Extra quality. *‡ delivered. *# add 4% sales tax. *a PRICE INDEXES or CENTRIFUGAL CAST IRON PIPE (Include carload freight allowed to city). These also serve as the HISTORICAL RECORD of THE $ PER NET TON PRICE of CLASS B, B&S. PIT CAST IRON PIPE. F.O.B. Foundry Price Indexes Birmingham, Ala., 125.8; Burlington, N. J., 134.6. For explanation of index see ENR Sept. 29, 1955 page 139. *b Extra strength. *c 4-in., $130. *d SS361-A. *e 21 in. *g culvert pipe: reinf., ASTM C 75–56. *h reinf., ASTM C 75–54. *i reinf., ASTM C 76–55. *j centrispun. *k less 2% disc. for cash. *l fob plant. *m truck del. *n LCL del., fob truck. *p less 5% disc. 10th. *p freight allowed to destination in city. *u 35,000# minimum. *r less 2% disc. 10 days. *s 1 ft lengths. *u CSA A 60. *v standard strength. *w SS; add 20% for d.s. *x fob city. *y Reinforced. *z Upper value in range based on both truck lots and less than truck lots, fob city; lower value truck lots delivered. *A single strength. *B truckload. *C less 2% disc. 15th. *D ASTM 76–57. *E less 1% disc. 10 days. *F less 2% disc. 30 days. *G LCL. *H CL. *I fob origin, freight allowed. *J reinf. B14–15. *K Less 2% disc. 15 days. *L ASTM 13–57. *M ASTM 200–57. *N 2 ft lengths. Trucklots. *O add 2% Sales Tax. *P 18 in. *Q less 1% disc. 10th. *R revised. *S ASTMC 72, 12" 1.55, 24" 4.00. *T Second price transite pipe. *U Type K.

Faster, easier dozing...





Faster dozing because you change speed range or direction with a flick of the wrist —no loss of power or momentum—no gear shift guesswork or clutching delay—save productive time on every cycle.

Full-power shift . . . fast-as-a-fox maneuverability

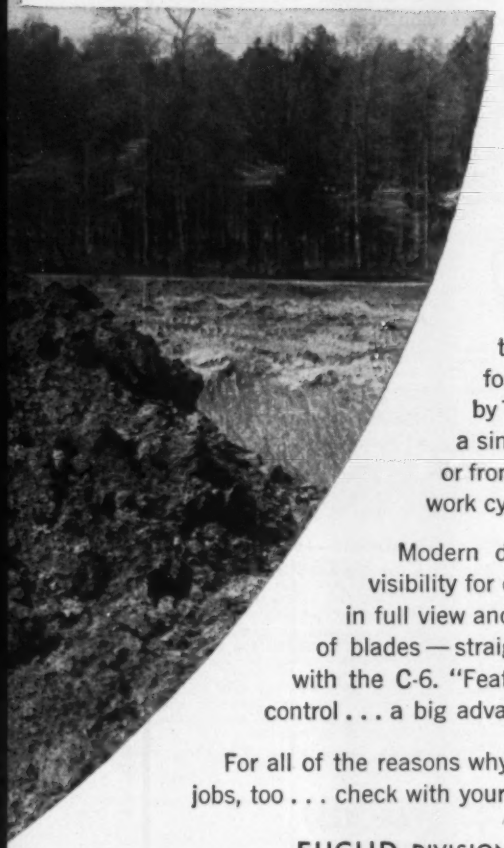
GM GENERAL MOTORS EUCLID

EUCLID

FOR MOVING EARTH, ROCK, COAL AND ORE

..and overall work-ability

put the "EUC" C-6 in a class by itself!



No matter what your dozing requirements may be—from small grading work for land improvement, plant sites or secondary road construction to the big yardage projects—the new Model C-6 Euclid Crawler offers the best return on your equipment investment.

The C-6 has proved its ability to "doze circles" around other tractors in the 200 h.p. class on job after job. One of the reasons for this outstanding performance is the full-power shift provided by Torqmatic Drive. There's no time lost in clutching and shifting... a simple flick of the wrist changes from one speed range to another, or from forward to reverse and back again. You save seconds on every work cycle . . . keep power matched to the load and job conditions.

Modern design, with rear-mounted radiator, gives the operator better visibility for dozing. The blade is close to the front of the tractor where it is in full view and provides good balance and stability. There is a complete line of blades—straight, angle and "U"—engineered for top dozing performance with the C-6. "Feathered steering" results in smooth turning and positive track control . . . a big advantage on difficult slope work.

For all of the reasons why the C-6 has more work-ability on dozing . . . and other crawler jobs, too . . . check with your Euclid dealer for performance facts and figures.

EUCLID DIVISION OF GENERAL MOTORS • CLEVELAND 17, OHIO

Plants at Cleveland and Hudson, Ohio and Lanarkshire, Scotland

Good balance with heavy dozer attachments... rear-mounted radiator permits close mounting of straight, angle or "U" blade at front and provides excellent visibility for operator. Quick shift permits "rocking" the tractor to get under big boulders, stumps, etc. Power, speed and fast maneuverability, combined with a rugged undercarriage that stands up under heaviest service, make the C-6 a top performer.

Torqmatic Drive...211 net h.p....easy service accessability

Construction Reports

Bids Asked—Low Bidders—Contracts Awarded—

NEW ENGLAND

HEAVY CONSTRUCTION—BA

▲† **Connecticut**—BA 4/18—U. S. Eng., 424 Trapelo Rd., Waltham, Mass., FLOOD CONTROL DAM, West End Mad River, $5,000,000. Buck & Buck, 650 Main St., Hartford, engrs. CD 3/9/61.

BUILDINGS—BA

▲ **Mass., Springfield**—BA 3/28—Massachusetts Mutual Life Insurance Co., 1295 State St. (selected list of bidders), OFFICE ADDN., State St. Approx. $5,000,000. Hoyle, Doran & Berry, 248 Boylston St., Boston, archts. CD 3/2/60.

HEAVY CONSTRUCTION—LB & CA

▲ **CONNECTICUT**—State Hy. Comr., 170 Douglas St., Hartford, ROADS,

Angelo Tomasso, Inc., Warren St., New Britain, Conn., CA $5,159,762, 22,109 lin. ft. c. conc. pavement on Interstate Rte. 84, incl. 11 bridge structures and 2 box culverts, Federal Aid Project E1-EIG-84-3(23) 42, Southington. CD 1/25/61, under LB.

BUILDINGS—LB & CA

▲ **Adolph Bialek**, 17 Punch Bowl Dr., Westport, Conn., CA $4,000,000, 200 HOUSES, Wepawaug Country Club area, ORANGE, CONN. Leon A. Katz, 125 E. 170 St., New York, N. Y. CA 3/1/61.

MIDDLE ATLANTIC

BUILDINGS—BA

▲ **N. Y., Buffalo**—BA 4/3—General Services Admin., P. Bldgs. Service, Acquisition and Disposal Div., 250 Hudson St., New York 13, N. Y., build-lease, 40,000 sq. ft. OFFICE, LABORATORY, STORAGE and GARAGE SPACE for use by Department of Health, Education and Welfare, Food and Drug Administration, Bid No. 2PRA-674. CD 1/16/61.

▲ **N. Y., New York**—BA 4/12—Comr. Parks, Arsenal Bldg., Central Park, 64 St. and 5 Ave., New York, Zone 21, Proj. P-426, general contract; Contr. M-231-159, electrical work; Contr. M-231-259, plumbing; Contr. M-231-359, heating and ventilating; Contr. M-231-459, moving stairs; Contr. M-231-559 and sprinkler work; Contr. M-231-659, underground Lincoln Square GARAGE, bridge, public plaza at Lincoln Center for Performing Arts, Broadway, Amsterdam Ave., W. 62 to W. 65 Sts., Manhattan Boro. $11,000,000. Plans deposit $10. Harrison & Abramovitz, 630 3 Ave., New York 20, N. Y., archts. Syska & Hennessey, 144 E. 39 St., New York 16, N. Y., mechanical engrs. Jacob Feld, 60 E. 23 St., New York 10, N. Y., structural engr. CD 3/6/61.

BUILDINGS—SLC

▲ **Pa., Phila.**—American Federation of Labor Hospital Assoc., 253 N. Broad St., soon lets contract HOSPITAL, Langdon St. $4,000,000. Ellerbee & Co., 333 Sibley St., St. Paul, Minn., archts. McCormick, Taylor & Assocs., 1617 Pennsylvania Blvd., engrs. CD 5/13/61.

HEAVY CONSTRUCTION—LB & CA

▲† **Peter Kiewit Sons Northern Corp. & Danish Arctic Contractors**, 122 E.42 St., New York 17, N. Y., U. S. A., LB $5,744,600, Base Bid Items 1-76, misc. items (CY-61) to incl. rehabilitation existing ELECTRICAL DIST. SYS., modify standby power for ILS plants, Tacan and Control Tower (THu 116-9) repair to heat distr. sys., alterations and replacement of gate valves in heat distr. sys., repair of mechanical rooms; repairing of roofs; utilities (CY 61) ENG 30-347-61-21, THULE AIR BASE, GREENLAND. U. S. Eng., 346 Broadway, New York 13, N. Y., U. S. A. BA 3/8. CD 3/2/61.

▲ **PENNSYLVANIA**—State Hys. Dpt., 506 North Office Bldg., Harrisburg, BRIDGES,

Pa.—**The Lathrop Co.**, Box 772, 1510 Montcalm, Toledo, O., LB $3,628,381, approach spans and ramps for Fort Duquesne Bridge, work on superstructure, sidewalk, conc. decks, etc., 1,083 ft., Allegheny Co.; LB $1,842,337, 1,172 ft. con. of the Point Park Portal consisting of 182 ft. span rein.-con. arch bridge, L.R. 246(1), T.R. 22-30, Allegheny Co.;

Pa.—**Kingston Contg. Co.**, West Point, Pa., LB $452,240, 6.07 mi. con. of 4 prestressed concrete bridges and service, L.R. 141(14) T.R. 22, Berks Co. BA 3/3/61. CD 2/14/61.

BUILDINGS—LB & CA

▲ **Aluminum Ltd.**, 620 5 Ave., New York, N. Y., **Bridgeport Brass Co.**, 30 Grand St., Bridgeport, Conn., **Cerro de Pasco Corp.**, 300 Park Ave., New York 22, N. Y., **Scovill Mfg. Co.**, 161 E. 42 St., New York 17, N. Y., Owners Build, $30,000,000, ALUMINUM HOT ROLLING MILL, OSWEGO, N. Y. (Correction—owners' address) CD 2/23/61.

▲ **Jowalpet Constr. Co.**, 589 Central Ave., East Orange, N. J., CA Over $15,000,000, 1,100 HOUSES, Spotswood-Englishtown Rd., Monroe Twp., SPOTSWOOD, N. J. W. J. Happel & Co., 589 Central Ave., East Orange, N. J. Leonard Levine, 589 Central Ave., East Orange, N. J., archt.

▲ **Harold Kramer & Sam Yarosh**, 100 Radie Ave., Passaic, N. J., Owner Builds, $5,000,000-$6,000,000, 250 HOUSES, Weiman Blvd., WAYNE, N. J. Rudolph Novak, 89 Central Ave., Clifton, N. J., archt.

SOUTH

BUILDINGS—BA

▲ **Va., Alexandria**—BA 4/4—Virginia Conference of the Methodist Church, 4016 West Broad St., Richmond, Hermitage HOME FOR AGED, Franklin Ave. Plans deposit $50. Allen J. Dickey, 704 North Glebe Rd., Arlington, archt. Extended date. CD 1/23/61.

▲† **N. C., Camp Le Jeune**—Bids Asked—P. Wks. Office, 5th Naval Dist., Norfolk, Va., completing 800-units CAPEHART HOUSING, Marine Corps Base. Bids will be asked from list of former bidders on project. Contractor defaulted on job. CD 1/29/59, under CA.

BUILDINGS—LB & CA

▲ **Airway Hotel of Washington, Inc.**, 5055 N.W. 36 St., Miami Springs, Fla., CA $4,000,000, build and operate 5 story 200-room rein.-con. HOTEL, Dulles International Airport for Federal Aviation Agency, CHANTILLY, VA. Bureau National Capital Airport Federal Aviation Agency, 1711 New York Ave. N.W., Wash. 25, D. C. Herbert Mathes, 1451 N. Bay Shore Dr., Miami, Fla., archt. CD 7/7/60.

▲ **Blake Constr. Co.**, 1120 Connecticut Ave. N.W., Wash., D. C., LB $5,248,000, MEDICAL EDUCATION BLDG., RICHMOND, VA. Medical College of Virginia, 523 N 12th, Richmond, Va. BA 2/28/61. CD 1/19/61.

▲ **Doyle & Russell**, Central National Bank Bldg., Richmond, Va., LB $3,874,444, (11 bidders), 15 story OFFICES, East Broad St., RICHMOND, VA. State Hy. Dpt., 1221 East Broad St., Richmond, Va. BA 3/8/61. CD 2/8/61.

▲† **Combustion Engineering, Inc.**, 911 W. Main St., Chattanooga, Tenn., CA $17,440,000 (for first boiler) $34,660,000 (for two boilers) BOILER for 900,000 kw steam generator, a site for which has not been selected, KNOXVILLE, TENN. Tennessee Valley Authority, Knoxville, Tenn. CD 1/24/61, under LB.

MIDDLE WEST

HEAVY CONSTRUCTION—BA

▲† **Illinois**—BA 4/6—U. S. Eng., Clock Tower Bldg., Rock Island, DRURY DRAINAGE DIST. FLOOD CONTROL PROJECT, Mississippi River, Rock Island Co., at left bank Mississippi River, Rock Island Co. CIVENG-11-117-61-45, $100,000,000. CD 9/29/59.

BUILDINGS—BA

▲ **Ill., Joliet**—BA 3/28—St. Joseph's Hospital, Joliet, HOSPITAL ADDN. $8,000,000. Foeler Schober, Berners, Safford & Jahn, Architects Bldg., Green Bay, Wis., archts. CD 8/15/60.

▲ **O., Cleveland**—BA 5/9—Veterans Admin., Munitions Bldg., Wash., D. C., 800 bed G. M. & S. HOSPITAL and REGIONAL OFFICE MEDICAL CLINICS, Veterans Admin., E. 105th St. and E. Blvd., Wade Park. $19,000,000. Extended date. Dalton-Dalton Assocs., Smith, Hinchman & Grylls Assoc., Inc., 3107 W. Grand Blvd., Detroit 2, Mich., archt. CD 2/8/61.

HEAVY CONSTRUCTION—LB & CA

▲ **MICHIGAN**—State Hy. Dpt., 732 Mason Bldg., Lansing 26 Bids opened 2/22, ROADS,

Mich.—**L. W. Edison**, 3134 Midland Dr. S. E., Grand Rapids, Mich., LB $2,540,947, 5.8 mi. freeway from Meridian Rd. east to Meech Rd. incl. grade separations at Meridian and Zimmer Roads, interchange at Williamston Rd. and twin bridges carrying freeway over Deer Creek, Ingham Co.; LB $2,914,588, 5.7 mi. freeway from Meech Rd. east to Ingham-Livingston county line near Webberville incl. grade separations at Dietz, Elm and Wallace roads, interchange at Stockbridge Rd. and twin bridges carrying freeway over Doan Creek, Ingham Co.;

Mich.—**Cooke Contg. Co.**, 1116 Penobscot Bldg., Detroit 26, Mich., LB $3,301,110, 7.8 mi. freeway from M-59 near Howell west to Ingham-Livngston county line, incl. grade separation at Nicholson rd., interchange at Fowlerville Rd., 2 sets of twin bridges to carry freeway over west and middle branches of Red Cedar River and another bridge to carry a service road over west branch of Red Cedar River, Livingston Co.; LB $2,871,402, 3.1 mi. freeway from Fenton Rd. southeasterly to Chesapeake and Ohio tracks south of Grand Blanc, incl. grade separations at Grand Blanc and Cook roads and interchange at Holly Rd., Oakland Co., CD 2/9/61; LB $224,321 ½ mi. addnl. roadway to extend dual divided US 24 (Telegraph Rd.) from Haskell St. north to Wabash RR tracks, Taylor Twp., Wayne Co.;

Mich.—**Holloway Constr. Co.**, 29350 Joy Rd., Livonia, Mich., LB $2,199,990, 7.9 mi. freeway from Wolverine north toward Indian River incl. grade separation at Rondo Rd., Cheboygan and Otsego Counties; LB $3,663,099, 10.5 mi. freeway from Vanderbilt in Otsego county north to Wolverine in Cheboygan County, incl. interchange at Alexander Rd. and interchange at Wolverine Rd. and twin bridges carrying the freeway over the Sturgeon River, Cheboygan and Otsego Counties. CD 2/8/61.

Mich.—**C. J. Rogers, Cooke Contg. Co.**, 14836 Grand River, Detroit 27, Mich., and **Jutton-Kelly**, 13240 Alber Ave., Dearborn, Mich., LB $2,411,015, 3.9 mi. freeway from Chesapeake & Ohio tracks in Genesee Co. southeasterly to Evans Rd. in Oakland Co. incl. grade separation at Baldwin Rd. and an interchange with existing US-10 just north of Evans Rd., Cheboygan and Otsego Counties; LB $763,993, detour constr. and structure work on Walter P. Chrysler Freeway at Jefferson and Hastings in Detroit, Wayne Co.

BUILDINGS—LB & CA

▲ **Sumner Sollitt Co.**, 307 N. Michigan Ave., Chicago, 1, Ill., CA $10,000,000, 27 story, 161 x 170 ft., brick, concrete block APARTMENT, 1555 N. Dearborn St., CHICAGO, ILL. Cosmopolitan National Bank, 810 N. Clark St., Chicago, Ill. BA 7/31/60. CA 2/17/61. CD 7/29/59.

MISSISSIPPI TO ROCKIES

HEAVY CONSTRUCTION—BA

▲† **Tex., San Antonio**—BA About 4/20—U. S. Eng., 606 Santa Fe Bldg., Galveston, U. S. AIR FORCE SCHOOL OF AVIATION MEDICINE, Phase II, Brooks Air Force Base, ENG-41-243-61-18, $8,000,000. CD 10/3/60.

BUILDINGS—SLC

▲ **Tex., Fort Worth**—Sears, Roebuck & Co., 925 S. Homan, Chicago, Ill., soon lets contract 1 story, 1,000,000 sq. ft., fl. sp., brick, tile, concrete steel, Seminary South Regional SHOPPING CENTER, $8,000,000. Geo. L. Dahl, 2101 N. St. Paul, Dallas, archts. CD 2/13/61.

HEAVY CONSTRUCTION—LB & CA

▲† **Nolan Brothers, Inc.**, P. O. Box 218, Wichita Falls Tex., LB $6,642,236 SPILLWAY and COMPLETION EMBANKMENT, John Redmond Dam and Reservoir Proj., Grand (Neosho) River, ENG-34-066-61-53, KANSAS. U. S. Eng., P. O. Box 61, Tulsa 2, Okla. BA 2/24. CD 2/8/61.

BUILDINGS—LB & CA

▲ **Rust Engineering Co.**, 2316 4th Ave., N. Birmingham, Ala., CA $4,000,000, design and construct 20,000 kw. STEAM GENERATING PLANT, CROSSETT, ARK. The Crossett Co., Crossett, Ark. CD 2/27/61.

▲† **Del E. Webb**, 2727 North Central Ave., Phoenix, Ariz., CA $6,559,900, 400 units Capehart Act Family DWELLINGS, Offutt Air Force Base, ENG-25-600-61-42, Omaha, FORT CROOK, NEB. Base Procurement Office, Offutt Air Force Base, Fort Crook, Neb. Henningson, Durham and Richardson, Steele Sandhorn and Weinstein, 252 Aquilla Court, Omaha, Neb., archts. CD 12/28/60, under LB.

▲ **San Gabriel Village Sales, Inc.**, 8200½ Menaul Blvd. N.E., Albuquerque, N. M., Owner Builds, $4,000,000, 250 HOUSES, ALBUQUERQUE, N. M.

FAR WEST

BUILDINGS—BA

▲† **Ariz., Fort Huachuca**—BA 3/30—U. S. Eng., 751 Figueroa St., Los Angeles, Calif., CAPEHART HOUSING, Proj. 123-81914 Army No. 7, ENG-04-353-61-46, $4,000,000. Plans deposit $10. CD 11/25/60, under LB.

▲ **Calif., LaJolla**—BA 4/6—University of California, Bd. Regents, General Service Bldg., Scripps Institute of Oceanography, 7 story, 150,000 sq. ft. rein.-con. LABORATORY and HEATING PLANT, University City. $4,000,000. Plans deposit $400. Risley & Gould, 2502 West Third St., Los Angeles, archts. CD 8/24/60.

BUILDINGS—LB & CA

▲ **S. Jon Kreedman & Co.**, 9350 Wilshire Blvd., Beverly Hills, Calif., Owner Builds, $8,500,000, concrete OFFICE, 9601 Wilshire Blvd., BEVERLY HILLS, CALIF.

▲ **M. J. Brock & Sons**, 2984 Rowena Ave., Los Angeles 39, Calif., CA $5,500,000, concrete APARTMENT, 1850 Whitley Ave., LOS ANGELES, CALIF. Hollywood Ardmore, Inc., 7003 Hollywood Blvd., Los Angeles 28, Calif. Bernhard Cardan, 8417 Beverly Blvd., Los Angeles, Calif., archt. CD 11/4/60.

▲ **F. E. Young Constr. Co.**, 3141 Main St., San Diego, Calif., LB $13,630,000, County men's DETENTION CENTER, Bauchet St., LOS ANGELES, CALIF. Bd Supervs. Los Angeles Co., Hall of Records, Los Angeles, Calif. BA 3/8. CD 1/16/61.

▲† **Albert Gersten Building Co.**, 8530 Wilshire Blvd., Beverly Hills, Calif., CA $9,837,000, 600 units, No. 3 Capehart HOUSING, incl. utilities, sewage, etc., Proj. IFB-61-1, TRAVIS AIR FORCE BASE, CALIF.

Base Procurement Office, Cannon Dr., Travis Air Force Base, Calif. CD 12/1/60, under LB.

CANADA

BUILDINGS—BA

▲ **N. S., Halifax**—BA 3/22—Webb & Knapp (Canada) Ltd., 1010 St. Catherine St. W., Montreal, Que., SHOPPING CENTER, Bayers Rd. and Monkford St. $9,000,000. John Graham, 2 Carlton St., Toronto, Ont., assoc. archts. Keith L. Graham & Associates, 53 Spring Garden Rd., archts. CD 8/29/60.

U. S. POSSESSIONS

BUILDINGS—BA

▲† **Canal Zone, Gorgas**—BA 6/12—Panama Canal Co., Balboa Heights, 7 story, 200 x 200 ft. rein.-con. with precast concrete sunshades, caisson fdns., 130-bed Gorgas HOSPITAL addn. $4,200,000. Kelly & Gruzen-Helge Westermann, 10 Columbus Circle, New York 19, N. Y., assoc. archts. Dr. Lev Zetlin, 114 East 32 St., New York 16, N. Y., structural engr. Joseph R. Loring & Assocs., 25 West 45 St., New York 36, N. Y., mechanical engrs. CD 3/3/61.

AMERICANS ABROAD

BUILDINGS—LB & CA

▲ **Morrison-Knudsen International Constructors,** 319 Broadway Ave., Boise, Idaho, U.S.A. H. K. Ferguson Co., 1783 E. 11th St., Cleveland, O., U.S.A. and Girdler Constr. Co., 1721 S. 7th St., Louisville, Ky., U.S.A., CA Est. $38,000,000, Urea PLANT Palembang, Sumatra, INDONESIA. Govt. of Indonesia, Jakarta, Indonesia. This replaced contract awarded last year to Foster Wheeler Corp. CD 5/21/59, under CA.

LATIN AMERICA

HEAVY CONSTRUCTION—BA

▲† **PANAMA**—BA 3/29—Bureau P. Rds., Minister P. Wks., Panama City, ROAD,
Section 6 on Inter-American Hy. from La Concepcion to Costa Rica Border, Panama Proj. 17-S. Plans deposit $100.

PROPOSED PROJECTS

WATER SUPPLY

▲ **Mich., Drayton Plains**—Waterford Twp. Water Supply, 4995 Highland Rd., Drayton Plains, interconnecting WATER SUPPLY MAINS SYS. $15,000,000. Johnson & Anderson, 1307 Pontiac State Bank Bldg., Pontiac, consult. engrs. CD 2/20/57, under Mich., Waterford.

SEWERS, WASTE DISPOSAL

▲ **Ind., Hammond**—City, City Hall, SEWERAGE SYSTEM RELIEF, first phase, $7,000,000, second phase $3,000,000, third phase, $2,000,000; SEWAGE TREATMENT PLANT ADDN., $2,500,000. Consoer Townsend & Assocs., 360 E. Grand Ave., Chicago 11, Ill., consult. engrs.

▲ **Pa., Feasterville**—Lower Southampton Sewer Authority, SEWERAGE SYSTEM, $4,200,000. Gannett, Fleming, Corddry, & Carpenter, Inc., 600 N. 2nd St., Harrisburg, consult. engrs. Bids in Fall.

BRIDGES

▲ **CALIFORNIA**—State Div. Hys., 1120 N St., Sacramento, BRIDGES,
Los Angeles Co.—traffic separation structures and approaches for future eight lane freeway on San Diego Freeway in Long Beach and Signal Hill between Studebaker Rd. and Cherry Ave. $3,700,000. Bids April or May 1961.
Mendocino Co.—structures and approaches for first unit of future 4 lane freeway on US Hy. 101 from Ford Rd. to 0.5 mi. south of Forsythe Creek north of Ukiah, portions. $1,750,000. Bids April 1961.

▲ **WASHINGTON** — State Hy. Comn., Transportation Bldg., Olympia, BRIDGE,
King Co.—underwater crossing of Lake Washington Ship Canal as extension of Empire Expressway, $16,000,000. Worthington, Christiani & Fenco (Worthington, Skilling, Helle & Jackson, Seattle, Wash., Christiani & Nielsen, New York, N. Y. and Foundation of Canada Engineering Corp., Vancouver, B. C., Canada) Washington Bldg., Seattle, consult. engrs. CD 3/16/60, under Wash., Seattle.

STREETS AND ROADS

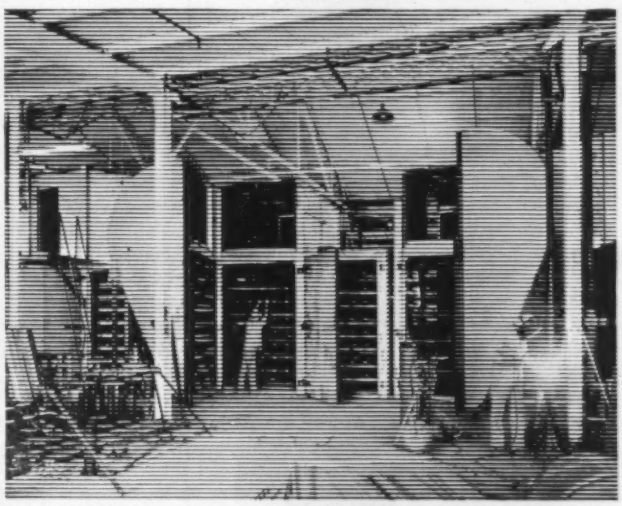
▲ **MASSACHUSETTS** — Commonwealth Mass., Dpt. P. Wks., 100 Nashua St., Boston, ROAD,
Chelmsford, Lowell and Tewksbury—Section Interstate Rte. 495, incl. 8 bridges. Approx. $4,000,000. Bids March 1961.

▲ **OHIO**—State Hy. Dpt., State Depts. Bldg., Columbus, Zone 15, ROAD,
Mahoning Co.—6½ mi. Lake Erie-Ohio River Hy. between Rte. 224 north to Rte. 18. $5,000,000. John Glancy & Assoc., 525 W. Main St., Canfield, consult. engr.

▲ **Rhode Island**—State R. I. & Prov. Plants, Div., Purchase, State House, ROAD,
Johnston and Scituate—3½ mi. Interstate Hy. Rte. No. 6, $7,000,000. Edwards & Kelcey, 470 Atlantic Ave., Boston, Mass., consult. engrs. CD 9/28/60.

(Continued on page 72)

WHERE IN THE
WORLD DO YOU NEED
CONSTRUCTION?
OIL / GAS / WATER / PRODUCTS / PIPELINE SYSTEMS
WILLIAMS BROTHERS
ENGINEERS - CONSTRUCTORS
NBT BUILDING, TULSA, OKLAHOMA
CABLE: WILLBRO
NEW YORK / WASHINGTON / LOUISVILLE / MINNEAPOLIS / CARACAS
BOGOTA / LA PAZ / EDMONTON / CALGARY / LONDON / ANKARA / TEHRAN



ON SCHEDULE INSTALLATION

Typical of Pacific Crane and Rigging's activities is this installation of a gypsum board conveyor and drying oven. Modification and installation of precision equipment with a minimum of down time is a P. C. & R. specialty.

For over 25 years P. C. & R.'s equipment and experienced personnel have successfully served industry on jobs as varied as one's imagination.

Pacific Crane & Rigging Co. MECHANICAL CONSTRUCTORS

NEvada 6-9213
MEtcalf 0-6020
6855 E. Rosecrans Ave., Paramount, Calif.

POLE RIGGING • MECHANICAL PIPING • CRANE SERVICE • SPECIAL PROJECTS • MISSILE EQUIPMENT • JACK & ROLLER RIGGING • EQUIPMENT SETTING

Concrete outlasts asphalt 3 to 1

NATIONAL ROAD TEST GIVES THE EVIDENCE!

Sponsored by the American Association of State Highway Officials, the great National Road Test has been a revealing study. It has established important facts of design and construction for both concrete and asphalt pavements!

The test brings into focus the wide difference between the two pavement types. This completely impartial pavement test, the most significant of all time, was directed by the Highway Research Board. Side by side, concrete and asphalt test sections were given the same 2-year pounding under identical conditions of weather, soil and traffic loads.

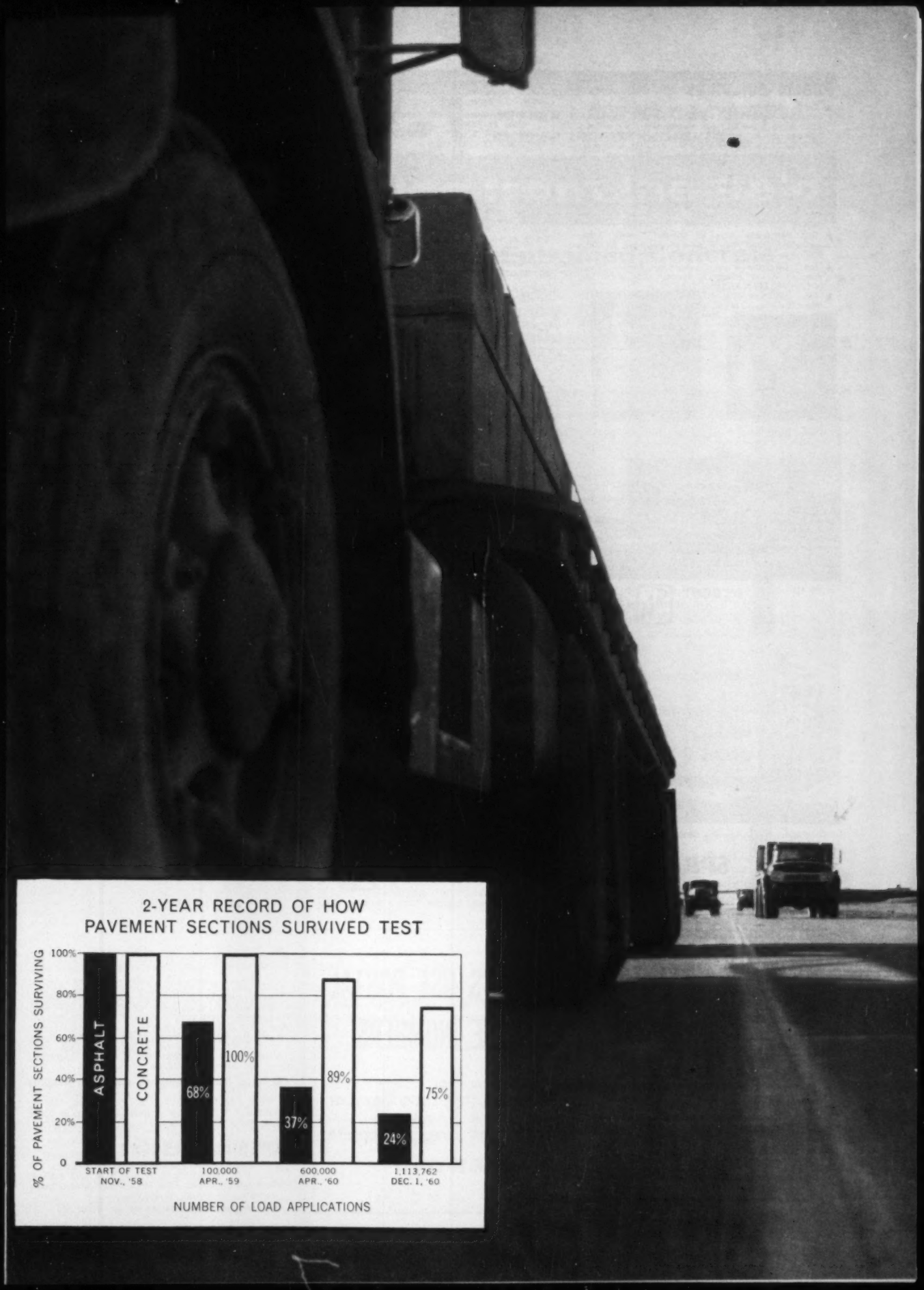
The results are clear for all to see. After 1,113,762 punishing loads, recorded by last November 30, 74.6% of the concrete was still performing. Of the asphalt sections, just 23.6% survived.

And not only did concrete outlast asphalt 3 to 1. Rideability measurements showed concrete ahead by a wide margin when test traffic ended.

Engineers and highway officials now have vital new evidence to support their choice of concrete for city streets, roads and Interstate highways.

PORTLAND CEMENT ASSOCIATION

A national organization to improve and extend the uses of concrete


2-YEAR RECORD OF HOW
PAVEMENT SECTIONS SURVIVED TEST
% OF PAVEMENT SECTIONS SURVIVING
100%
80%
60%
40%
20%
0
ASPHALT
CONCRETE
68%
100%
37%
89%
24%
75%
START OF TEST
NOV., '58
100,000
APR., '59
600,000
APR., '60
1,113,762
DEC. 1, '60
NUMBER OF LOAD APPLICATIONS

(Continued from page 69)

PUBLIC BUILDINGS

▲ **Calif., Berkeley**—Regents of the University of California, 2 Barrow Lane, plans by Aleck L. Wilson & Assoc., 256 Sutter St., San Francisco, 8 story, bsmnt., 225,000 sq. ft. rein.-con. slab on grade BUSINESS ADMINISTRATION. $4,570,000. Paquette & Maurer, 417 Market St., San Francisco, consult. engrs. CD 3/18/60.

▲ **Calif., Los Angeles**—Los Angeles Dpt. Water & Power, 207 S. Broadway, plans by Albert C. Martin & Assoc., 333 S. Beaudry Ave., Los Angeles, and Ladd & Kelsey, consult. archts., 76 N. Pasadena, Pasadena, 17 story GENERAL OFFICE incl. 3 level parking structure. $30,000,000. CD 9/18/59.

▲ **Ill., Harrisburg**—State of Illinois, Capitol Bldg., Springfield, HOSPITAL for mentally retarded, $4,000,000. John D. Jarvis, State Armory, state archt.

▲ **Ind., Lafayette**—Purdue University, Admin. Bldg., plans by Walter Scholer & Assocs., 1114 State St., OFFICE, $5,000,000. Bids 7/61.

▲ **Md., Baltimore**—City, Bureau Bldg. Constr., 410 Municipal Bldg., Zone 2, plans by Hopkins & Pfeiffer, 10 E. Mulberry St., Zone 2, 4-5 story preconcrete panel and brick curtain wall 1500 pupil JUNIOR COLLEGE, Liberty Heights Ave. and Western Md. RR. $3,900,000. Van R. P. Sace, 1701 St. Paul St., Zone 2, structural engr. James Posey & Assocs., 10 E. Pleasant St. Zone 2, mechanical engr. Raughley Porter, c/o owner, bldg. constr. engr. CD 12/29/60.

▲ **Nev., Reno**—Washoe County School Dist., 139 W. 6th St., plans by Farris & Askine, 458 California Ave., Wooster HIGH SCHOOL, $3,500,000. Bids March or April 1961. CD 10/14/59.

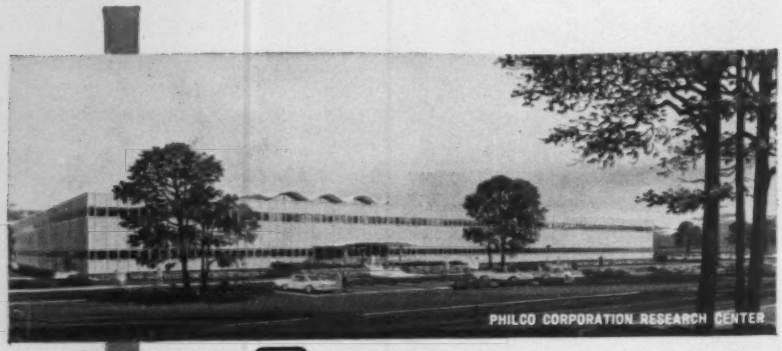
▲ **N. J., Paterson**—Bd. Freeholders Passaic Co; County Vocational School, 317 Pennsylvania Ave., COUNTY VOCATIONAL SCHOOL, Wayne. $4,000,000.

▲ **N. J., Trenton**—New Jersey Div. Purchase & Property, State House, plans by Kramer Hirsch & Carchidi, 115 W. State St., State Education Dpt. OFFICE BLDG. $3,500,000. Theodore G. Kauffeld, 150 Broadway, New York, N. Y., consult. engr. Bids in March. CD 9/20/60.

▲ **O., Warren**—Warren Metropolitan Housing Authority, 108, Main Ave., 250-300 units, low rent HOUSING, $4,000,000.

▲ **Ont., Hamilton**—City, City Hall, HOSPITAL ADDN., Concession St. $8,135,000.

▲ **Ont., Toronto**—Dpt. Educ., Parliament Bldgs., Queens Park, plans by S. B. Coon & Son, 745 Mount Pleasant Rd., two stage Ryerson INSTITUTE OF TECHNOLOGY EXPANSION, 50 Gould St. $6,000,000.



RECENT S&H FOUNDATION INVESTIGATION PROJECTS IN THE PHILADELPHIA AREA

Photos courtesy of: The Ballinger Company • Architects and Engineers • Philadelphia, Pa.

SPRAGUE & HENWOOD, Inc. S&H

SCRANTON 2, PA.

New York • Philadelphia • Nashville • Pittsburgh • Tucson • Grand Junction, Colo. • Buchans, Nfld.

COMMERCIAL BUILDINGS

▲ **Ill., Chicago**—Howard F. Wallach & Jerrold Wexler, 120 S. LaSalle St., Zone 3, plans by Hirschfeld, Pawlan & Reinheimer, 327 S. LaSalle St., Zone 4, 35 story, 248 unit APARTMENT, 1440 N. Lake Shore Dr. $8,000,000. Bids 3/61.

▲ **Ill., Springfield**—Franklin Life Insurance Co., 600 S. 6th St., plans by Hadley & Worthington, 1225 S. 6th St., 13 story OFFICE, $4,000,000. Bids about 6/1/61.

▲ **Md., Baltimore**—Charles Street Development Corp., c/o Vincent G. Kling, archt., 917 Corinthian St., Phila., Pa., 20 story OFFICE, N. Charles and Fayette Sts. $10,000,000. Geo. Matz, 1831 Chestnut St., Phila., Pa., mechanical engr. McCormick-Taylor Assoc., Suburban Station Bldg., Phila., Pa., structural engrs.

▲ **Md., Glen Burnie**—Edward J. DeBartolo & Assoc., 7620 Market St., Youngstown, O., mall-type SHOP CENTER, east side Gov. Ritchie Hy. south of here. $4,500,000.

▲ **Mass., Boston**—Charles River Park, Inc., 420 Lexington Ave., New York 17, N. Y., plans by Victor Gruen Assocs., 2 W. 13 St., New York 11, N. Y., Sections II-V to incl. 2 high rise and 2 low rise APARTMENTS and SHOPPING CENTER, Charles River Park. Total est. $48,000,000. Herman Boxer, 420 Lexington Ave., New York 17, N. Y., consult. engrs. Section II to go ahead Fall 1961. CD 11/27/56.

▲ **Mo., Kansas City**—Transcontinental Bus Sys., Inc., 1500 Jackson, Dallas, Tex., plans by Harold Berry, Hartford Bldg., Dallas, Tex., and Leon Maslan, assoc. archt., 1005 Grand, Kansas City, Mo., 29 story OFFICE with 5 floors for parking, bus terminal ground floor. $6,000,000. Bids Fall 1961.

▲ **N. J., Matawan**—William J. Levitt, Jr., c/o Jacobson Goldfard & Tanzman, 290 Hobart St., Perth Amboy, 1,000 DWELLINGS, Line Road Section. $15,000,000.

▲ **N. J., Paterson**—St. Joseph's Hospital, 703 Main St., plans by Fanning Assocs., 49 Ward St., SURGICAL-LABORATORY BLDG., OUT PATIENT and EMERGENCY BLDG. $3,619,500. To go ahead November 1961.

▲ **N. J., Toms River**—Louis Bock & Sons, Dock Ave., Waretown, plans by John L. Codomo, 505 Hillside Ave., Point Pleasant, 500 DWELLINGS, off Rte. 37, $5,000,000; 34-unit SHOPPING CENTER on Rte. 37, $2,000,000; 52-unit MOTEL and swimming pool, Winding River Rd., Manchester and Dover Twp., $1,000,000. John A. Ernst, Hyers St., consult. engr.

▲ **N. Y., Brooklyn**—Alexander Muss & Sons, Inc., Time Life Bldg., New York, Zone 20, plans by A. H. Salkowitz, 87-25 Homelawn St., Jamaica, 20 story, 380 unit Seacoast Towers No. 2 APARTMENT, Brightwater Ave. Over $5,000,000.

▲ **N. Y., Herrick (Br. Williston Park)**—Alexander Muss & Sons, Inc., Time & Life Bldg., New York, Zone 20, plans by A. H. Salkowitz, 87-25 Homelawn St., Jamaica, 250 HOUSES, 75 acres, Union Turnpike Extension between Marcus Ave. and Old Court House Rd. $7,500,000. Constr. April 1961. CD 2/13/61.

▲ **Pa., Phila.**—Rohm & Haas Co., 222 W. Washington Square, plans by George M. Ewing Co., Western Saving Fund Bldg., 250,000 sq. ft. HOME OFFICE, 6th and Market Sts. $6,000,000.

▲ **Tex., Houston**—Financial Capital Corp., Republic Natl. Bank Bldg., 13 story OFFICE, 3 acres, West Houston. $8,175,000.

▲ **Tex., Houston**—Westmont Corp., c/o T. J. Bettes Co., 201 Main St., plans by Welton Becket & Associates, 802 Lovett Bldg., 10 story TOWER OFFICE, No. 1, $4,000,000; 10 story TOWER OFFICE, No. 2, $5,000,000; RETAIL CENTER, $4,500,000, 13 acres, Post Oak and Westheimer Rds.

INDUSTRIAL BUILDINGS

▲ **Ark., Crossett**—The Crossett Co., Crossett, STEAM ELECTRIC GENERATING PLANT ADDN., incl. 20,000 KW steam turbine generator, bark-and-gas-fired boiler, and various pipe lines, $4,000,000. Rust Engineering Co., 2316 4th Ave., Birmingham, Ala., consult. engr.

▲ **Tex., Houston**—Tenneco Chemical Co., subsidiary, Tennessee Gas Transmission Co., Tennessee Bldg., 110 million lbs. capacity, ACETYLENE PLANT, Ship Channel, $110,000,000; PLANT to convert acetylene into vinyl chloride monomer. 200,000,000 lbs. annual capacity, in 794 acres tract on Ship Channel, $45,000,000. Construction to start by June 1. CD 2/10/56.

▲ **B. C., Burnaby**—Fraser Valley Milk Prod. Assn., 425 W.8th St., Vancouver, PLANT, $3,500,000. Phillips, Barratt & Partners, 2090 W. 4th St., Vancouver, consult. engrs. CD 8/31/59.

▲ **B. C., Crofton**—British Columbia Forest Products, Ltd., 1190 Melville St., Vancouver, NEWSPRINT MILL, $25,000,000. H. A. Simons Ltd., 16 E. Hastings St., Vancouver, consult. engrs. To go ahead in 1962. CD 1/27/61.

AMERICANS ABROAD

▲ **Pakistan, Karachi**—Intercontinental Hotels Corp., 135 E. 42 St., New York, N. Y., U. S. A. and Pakistan International Air Lines, Karachi, air-conditioned HOTEL, Clifton Area, $7,000,000.

(Proposal Advertisements see pp. 80 to 82)

DUDGEON HYDRAULIC JACKS

SALES RENTALS

• CAPACITY TO 600 TONS

FOR:
PILE TESTING
•
UNDER-PINNING
•
BRIDGES
•
PIPE PUSHING
•
SOIL TESTING

Write to Dept. R

RICHARD DUDGEON INC.

789 BERGEN ST. • ST 9-4040 • BROOKLYN, N. Y.

ALWAYS USE POSTAL ZONE NUMBERS

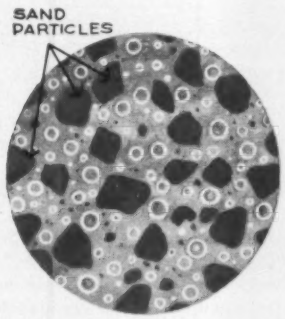
Without the zone number addresses are incomplete in 106 U. S. cities.

ALPHA news and notes from the field

BETTER CONSTRUCTION THROUGH BETTER USE OF CEMENTS

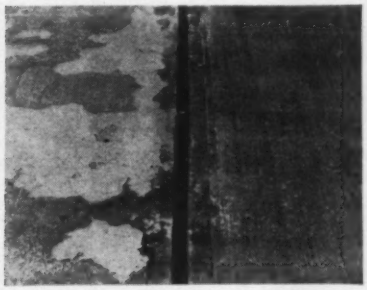
Where and How to Use Air-Entrained Concrete

Cement Plus Air



When an air-entraining admixture is introduced into a concrete mix it forms literally billions of tiny air bubbles. Air-entrainment was originally developed to make concrete more resistant to the harmful effects of freezing and thawing action. It also provides a number of desirable side effects. It is more cohesive and workable. It results in less bleeding or surface water; there is less danger of segregation and trapped air pockets and it has less tendency to dust when steel trowel finished.

Air-Entrainment Prevents Scaling



Concrete pavement subjected to severe weathering and frequent applications of salt. The unscaled pavement on the right of the expansion joint was built with air-entrained concrete. The heavily scaled pavement on the left was built with portland cement containing no air-entraining material.

During severe winters some concrete pavements have revealed surface scaling as a result of freezing and thawing and from the direct application of salt to remove ice. The extent of the scaling depends upon the amount and frequency of salt application and the quality and age of the pavement. Extensive laboratory research and field experiments show that concrete produced with air-entraining portland cement have excellent resistance to severe frost action and salt applications, provided salt is not applied too soon (never less than 6 weeks).

How Much Air

Best results with pavement mixes in which the maximum size of coarse aggregate is at least 1½ in. are obtained when the total air entrained in the concrete is as shown in the following table. For mixes in which the maximum size of coarse aggregate is less than 1½ in. the greater mortar content requires a somewhat higher total air content in the mortar.

Max. Coarse Aggregate	*Per Cent of Air*
1½ in.	5% ± 1%
¾ in.	6% ± 1%
⅜ in.	7½% ± 1%

Where to Use Air-Entrained Concrete

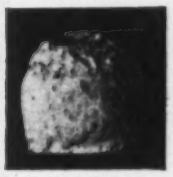
In areas where severe frost action prevails or where repeated applications of de-icing agents are made, air-entrained concrete should by all means be used. Its excellent weathering qualities, increased cohesiveness and better workability make it decidedly superior for jobs such as concrete pavements, bridge floors, large garages, warehouse loading docks, etc.

Mixing, Placing and Finishing

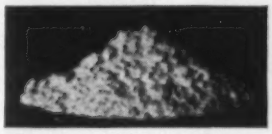
The mixing time for regular portland cement is also adequate for air-entrained cement. Inadequate mixing does not permit entrainment of sufficient air, and prolonged mixing may tend to decrease the entrained air. This makes it more important for the concrete user to be ready to place the concrete immediately after it has been mixed sufficiently to avoid prolonged mixing.

Air-entrained concrete can be readily handled and spread because the mix is very workable and cohesive, and is not apt to segregate. *Wheel, shovel or chute the mix into place, but do not flow.*

Good if vibration is used



Maximum slump



Too wet—will cause stickiness

Use a relatively dry mix with air-entrained concrete—not over a 4-inch slump on a *damp* sub-grade, and if vibration is used, the slump should not be over 1 inch. A dry mix is much easier to finish than a wet one.

Tips for Best Results

1. Be sure that air-entrained concrete is used on all exposed work where the job will be subject to freeze-thaw cycles. Air-entrainment is not a "cure-all", but is effective if the rules of good concreting are observed. It protects even some lean concrete against freeze-thaw damage.

2. Make sure that air-entrained concrete is at least 6 weeks old before subjected to salt or calcium chloride applications.

3. Be sure the air content of air-entrained concrete is sufficient (see table). If the air is too low, even air-entrained concrete can be damaged by freeze-thaw cycles—especially the first winter.

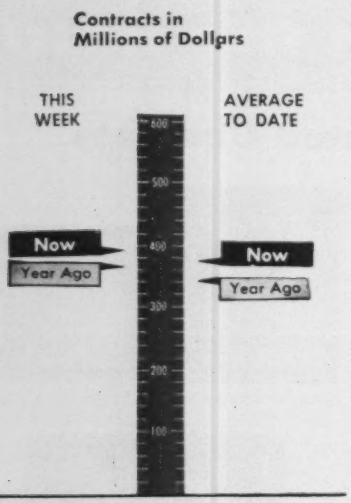
4. Encourage *closer* control of the slump for all work done in the late fall and winter—the sloppier the mix, the less effective the air-entrainment.

Reprints of the information on this page are yours for the asking.

ALPHA
PORTLAND CEMENT COMPANY
Alpha Building, Easton, Pa.

Construction Scoreboard

This Week...



AMOUNT OF CONTRACTS LET

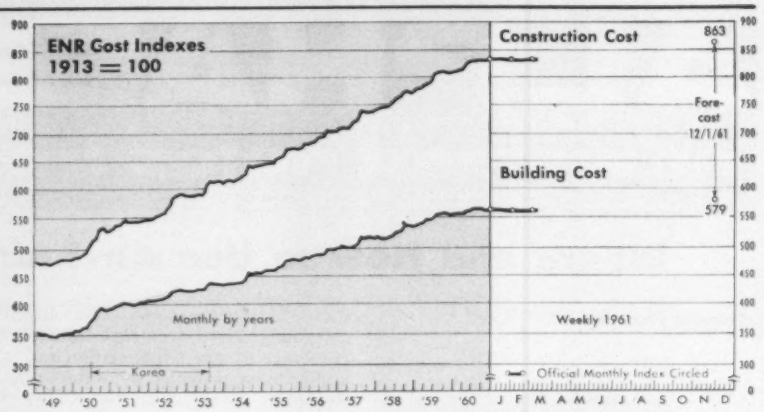
Contracts Awarded In 50 States By Type	This Week millions	Cum. 11 wks 1961 millions	Chge '60-'61 %
All Heavy Construction	$382.4	$4,173.5	+9
By Ownership			
PRIVATE	191.4	2,111.6	+3
PUBLIC	191.0	2,061.9	+16
State & Municipal	133.6	1,531.0	+18
Federal	57.4	530.9	+11
By Type of Work			
PUBLIC			
Waterworks	8.1	74.7	+19
Sewerage	11.3	125.6	+10
Bridges*	8.1	98.8	−46
Highways	78.1	708.5	+46
Earthwork, Dams & Waterways	17.9	134.1	+5
Buildings:			
Excl. Housing	51.2	512.5	+23
Housing	5.5	135.9	+53
Unclassified	10.8	272.0	−8
PRIVATE			
Buildings:			
Mass Housing	119.7	876.0	−11
Commercial	51.1	454.8	+23
Industrial	13.1	681.8	+34
Unclassified	7.5	98.8	−49

* Includes Private bridges

NOTE Minimum size projects included are: Waterworks and waterways, $53,000; other public works, $88,000; industrial buildings, $110,000; other buildings, $400,000.

NEW CONSTRUCTION CAPITAL

	Week of Mar. 9 millions	Cum. 10 wks 1961 millions	Chge '60-'61 %
Corporate Securities	$9.7	$316.2	−33
State and Municipal:			
All Except Housing	95.9	1,257.0	−11
Housing	1.1	4.0	−70
Federal Loans	1.3	43.0	+4
Federal Aid	0	0	0
Total Nonfederal	$108.0	$1,620.2	−16
Federal Appropriations:			
Project in U.S.	0	0	0
Outside U.S.	0	0	0
Total New Capital	$108.0	$1,620.2	−16


ENR Cost Indexes 1913 = 100
Construction Cost
863
Forecast 12/1/61
Building Cost
579
Monthly by years
Weekly 1961
Korea
Official Monthly Index Circled
'49 '50 '51 '52 '53 '54 '55 '56 '57 '58 '59 '60
J F M A M J J A S O N D

ENR INDEXES (1913 = 100), 20-cities' average	Week of Mar. 9 1961	% Change from Feb. 9 1961	% Change from Mar. 10 1960
Construction Cost	834.19	+0.01	+2.6
Building Cost	562.92	+0.03	+1.4

To convert above indexes to 1926 = 100: Divide Construction Cost by 2.080; Building Cost by 1.850.
1949 = 100: Divide Construction Cost by 4.770; Building Cost by 3.518.

Latest Month . . .

CONTRACTS AWARDED

	1961 Feb. (millions)	1961 2-Mos. (millions)	Percent Change from 1960 Feb.	Percent Change from 1960 2-Mos.
Total U. S. (ENR reported)	$1,360	$3,020	− 3	+13
Private	747	1,532	− 4	+ 6
Public	613	1,488	− 2	+22
State and Municipal	524	1,165	+ 4	+26
Federal	89	323	−25	+10
ENR Volume Index, 1913=100	464	506	− 5	+10

NEW CONSTRUCTION CAPITAL

Total U. S.	590	1,215	+ 6	−16
State and Municipal Bond Sales	456	906	+24	−19
Corporate Security Sales	119	267	−36	−14
Federal Loans, Aid (nonfederal work)	15	42	+107	+286
Federal Appropriations, *(federal work)	.....	.....	.....	.....

* Includes funds for outside U. S.

MATERIALS SHIPMENTS

	Dec. (D) 1960 Jan. (J) 1961	Cum. (No. of Mos.)	Percent Change from Year Ago Mo.	Percent Change from Year Ago Cum.
Portland Cement, Bur Mines, thous bbls	14,175(J)	14,175(1)	+11	+11
Concrete Paving Awards, PCA, thous sq yd	8,632(J)	8,632(1)	+16	+16
Fabricated Structural Steel, thous tons	232(J)	232(1)	+11	+11
Bookings, AISC, thous tons	272(J)	272(1)	+23	+23
Reinforcing Bars, Net, AISI, thous tons	143(J)	143(1)	−30	−30
Lumber, NLMA, mil fbm	2,271(J)	2,271(1)	−14	−14
Orders, mil fbm	2,372(J)	2,372(1)	−10	−10
Production, mil fbm	2,263(J)	2,263(1)	−16	−16
Clay Products, Bureau of Census				
Brick, Unglazed, Common, Face, mil bri	333(D)	6,466(12)	−28	−11
Vitrified Clay Sewer Pipe, thous tons	108(D)	1,859(12)	−18	− 6
Structural Tile, Unglazed, thous tons	32(D)	495(12)	− 5	− 5
Asphalt Products, Bureau of Census				
Asphalt Roofing, thous sales sqs	4,298(D)	59,260(12)	+49	−0.5
Asphalt Siding, thous sales sqs	74(D)	870(12)	+46	− 7
Aluminum, Wrought, Net, Bur Census				
Sheet and Plate (non-heat treatable), mil lbs	82(D)	1,206(12)	−24	− 6
Wire and Cable, mil lbs	23(D)	296(12)	− 6	− 8
Extruded Shapes (soft alloys), mil lbs	57(D)	812(12)	−21	−10

EMPLOYMENT AND FAILURES

Contract Const Employment, BLS, thous	2,362(J)	2,362(1)**	− 4	− 4
Contractor Failures, Dun & Bradstreet				
Number	219(J)	219(1)	+13	+13
Liabilities, thous	$11,231(J)	$11,231(1)	− 6	− 6

** Average per month

Congress Probes Hayes Default

Contractor's failure to complete $55 million worth of military housing may bring Capehart changes

The default by Los Angeles contractor Hal B. Hayes on $55 million worth of Capehart housing last year (ENR Aug. 18, 1960, p. 141) is now under scrutiny by a congressional committee.

The Senate preparedness investigating subcommittee, headed by Senator John C. Stennis (D., Miss.) began hearings last week on the suspension of construction by five Hayes-owned firms on Capehart projects at five military bases, and on the general operation of the Capehart program.

The investigation gets under way as Congress considers the Pentagon's 1962 fiscal year request for authorization to build additional Capehart housing units. The new request calls for more than 7,000 additional units at an estimated cost of nearly $115 million. Up to now, the program has involved over 100,000 units, which have been built or contracted for at a cost of $1.5 billion.

The inquiry also comes against the background of the recent critical report on the Capehart housing program by the General Accounting Office. GAO criticized the lack of housing expertese by military officials running the program, said Capehart housing requirements set by the military were excessive in certain cases, and recommended that the Federal Housing Administration be granted more direct responsibilities for the program.

Last May, the Hayes firms halted construction of some 3,500 family housing units valued at about $55 million. The projects are located at Beale AFB, Calif.; Ellsworth AFB, S. D.; Grand Forks AFB, N. D.; Fort Bliss, Tex.; and Camp LeJeune, N. C. In July, Mr. Hayes tried to withdraw his irrevocable power of attorney from the mortgages.

Since then, Mr. Hayes' lenders, surety company, construction subcontractors and building materials suppliers —who have been filing suits for millions of dollars worth of unpaid bills—and government agencies have become entangled in a complicated legal rumpus over their respective claims and counterclaims.

Last month, FHA and the Defense Department finally agreed on plans to complete construction of the projects. The Pentagon plans to resume work—with new construction contractors—in April. The housing units begun by the Hayes firms are now in varying stages of completion, ranging from 1% to 99% in place. Meanwhile, Mr. Hayes' surety company, which had granted 100% payment bonds on subcontracting and building materials and a 100% performance bond, has been settling claims.

The Defense Department and FHA, apparently have brushed aside Mr. Hayes' legal argument that he is the owner of the buildings in question, not just the contract builder. The government, in effect, has replaced the Hayes firms as the mortgagor of the projects in order to rush completion of the urgently needed military family housing units.

Almost $47 million worth of mortgages on the Hayes projects has been assigned. Of this total, $24.7 million has been disbursed by nine mortgagees, the remainder is listed as net undisbursed mortgage proceeds now held by FHA.

James B. Cash, Jr., deputy commissioner of the FHA, the first witness before the Stennis committee, said that "any additional costs resulting from the work stoppage last May, will not increase federal expenditures from appropriations for quarters allowances."

Mr. Cash, who has been an FHA official for only one month, said that any such costs will be paid by the surety company, Continental Casualty Co., or from FHA's insurance reserves—"as their respective liabilities are established."

Senator Stennis said his inquiry seeks to determine how to improve administration of the Capehart housing program. Said the senator: "I can't understand how $55 million worth of contracts could be let to what looks like dummy corporations." Senator Stennis has sent Mr. Hayes an invitation to appear before the committee, using the construction contractor's Los Angeles address. The senator says, however, he understands Mr. Hayes now lives in Mexico.

Mr. Cash said that "after careful consideration of this experience," he thought it unnecessary to make any changes in the Capehart law to prevent similar problems on military housing projects in the future.

He said that the major bottleneck in the Hayes case—the limited power of the government to step in and compel action—was removed by a recent change in FHA regulations dealing with the capital stock escrow agreement which Capehart contractors must sign. This will authorize the agency to step into a case involving a work stoppage in 20 days. The agency had to wait 110 days in the Hayes case.

Under the new rules, FHA may acquire the capital stock of the mortgagor corporation 20 days after default when the agency determines "after default that such acquisition is necessary for the protection of the FHA as insurer of the mortgage." Under the acquisition, FHA may exercise all rights as holder of the corporation's capital stock, including the right to arrange completion of construction.

"If we had had this authority to get control of the construction project before," Mr. Cash told ENR, "the Hayes problem would never have arisen."

The Stennis committee's counsel said that if FHA or the military had been an "obligee" in the performance bond, the government could have taken much more rapid action by having the right to terminate the construction contract for non-performance.

Mr. Cash said FHA had never established this procedure, but explained that the new escrow agreement will provide the same authority to the government.

Two Construction Execs Report Stock Transactions

H. E. Widdell, president of Arthur G. McKee & Co., Cleveland construction and engineering company, reported to the New York Stock Exchange last month that he sold 22,250 shares of McKee stock. This reduced his McKee holdings to 26,055 shares.

The purpose of the sale was to diversify Mr. Widdell's personal investments, say sources close to the 68-year-old executive.

In the same month, William L. Pfeiffer, a director of Williams-McWilliams Industries, Inc., New Orleans construction firm, bought 3,600 shares of that company's stock and acquired four shares as a stock dividend. Mr. Pfeiffer reported to the American Stock Exchange that the purchase and stock dividend increased his holdings to 3,704 shares.

New International® Trucks

The most-improved light-duty models in INTERNATIONAL history!

Leading the field is the new INTERNATIONAL model C-120(4x4), 7,000 lbs. GVW. This new all-wheel-drive is practically the same height as regular models, now has single stick shift for power dividing transfer case. Shown here with unique Travelette cab, room for 6 men plus 6-ft. pickup body.

7 times better to meet your truck needs

1. Overall height of new INTERNATIONAL models is up to 5 inches lower without sacrificing ground clearance or cab room.

2. Choice of new independent torsion-bar front suspension or I-beam front axle with leaf-type springs for more driver comfort and greater load protection.

3. New hydraulically-assisted clutches in all models ease shifting effort, and also reduce linkage and maintenance.

4. New rigid box section frames or sturdy channel frames take any punishment in stride.

5. Wheelbases are 5 inches longer to improve the ride and give better angle of approach and departure.

6. New contoured grille and restyled sheet metal with sloping hood give you a new look, king-size visibility.

7. Seven regular models with GVW ratings from 4,200 to 8,800 lbs. – plus the special new model C-100 – present a complete light-duty line-up.

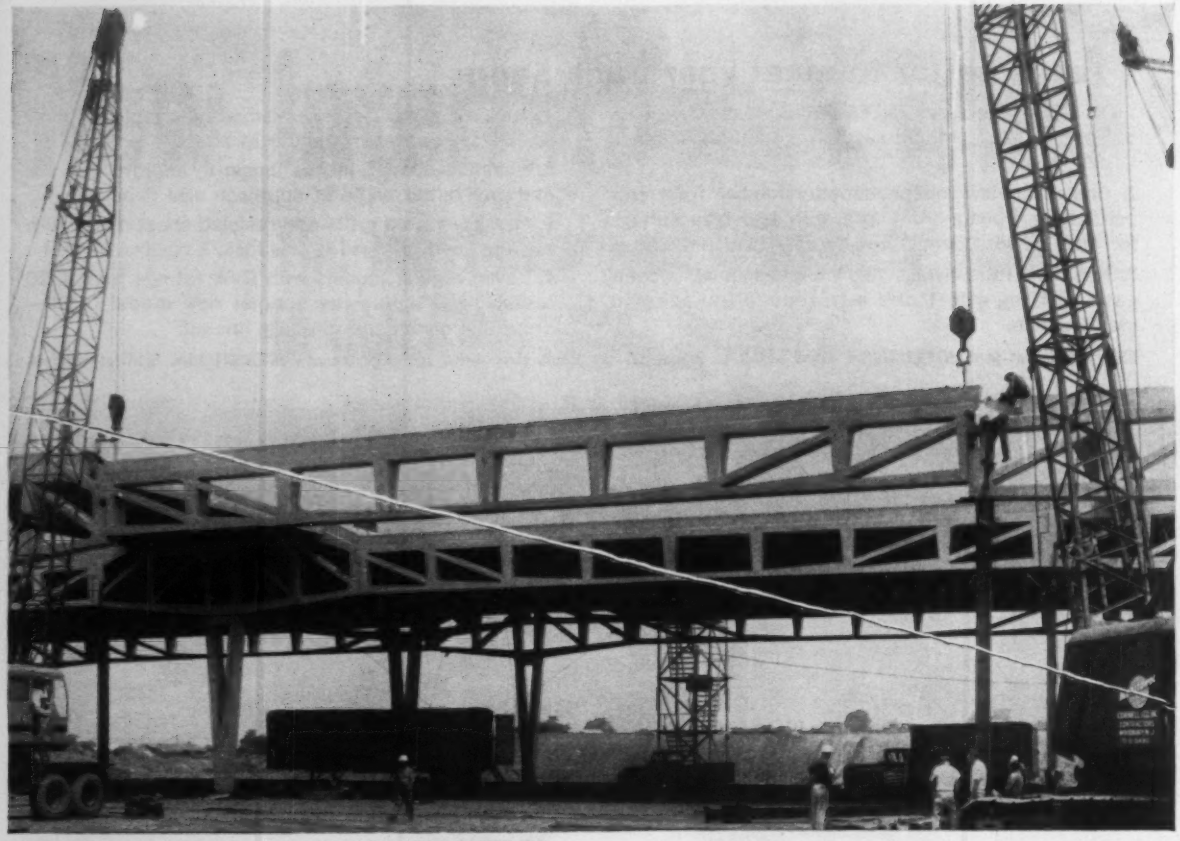
Stop in today at your INTERNATIONAL Truck Dealer or Branch for the whole story. Drive and price the new INTERNATIONAL light-duty models.

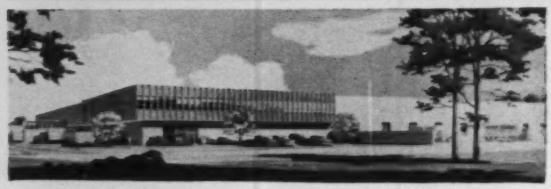
Your most reliable worker can be a new INTERNATIONAL with standard pickup body. Sand-tight box with sturdy all-steel construction throughout. Ribbed floor lessens the friction when loading or unloading. Body lengths of 7 and 8½ feet. V-8 engine power is standard, "sixes" and more powerful V-8 optional. All-wheel-drive models available – let you go anywhere, anytime.

INTERNATIONAL® TRUCKS IH®

WORLD'S MOST COMPLETE LINE

International Harvester Company, Chicago • Motor Trucks • Crawler Tractors
Construction Equipment • McCormick® Farm Equipment and Farmall® Tractors





Post-tensioned Vierendeel truss 80 ft in length designed by A. E. Komendant being set by cranes between 20-ft cantilever sections creating 120-ft span. By this method, Merchants Refrigerating Co., freezer plant at Secaucus, N. J., was constructed with clear spans 120 ft in length, and bay areas of 5000 sq ft. Savings in time and cost were also achieved. Designers and Engineers: Abbott, Merkt & Co., New York City; General Contractor: Turner Construction Co.; **Prestressed Concrete Fabricators: Atlantic Prestressed Concrete Division, Warner Co., Trenton, N. J.**

PRESTRESSED CONCRETE SAVES COLD CASH FOR LARGE REFRIGERATING COMPANY

Redesigning a new 440 x 360-ft cold storage room with prestressed concrete led to some interesting advantages for Merchants Refrigerating Co., of Secaucus, N. J.

First, use of post-tensioned 80-ft drop-in spans set between 20-ft cantilevers resulted in spacious, column-free bays. Then, designing the supports as V-shaped columns helped to overcome effectively the 100°F differential between summer erection and a −10°F operating temperature. Insulation, too, became a much simpler matter with prestressed, and sub-zero painting problems were eliminated.

Costs for this prestressed concrete structure were competitive with alternate designs. In addition, this method reduced fabrication and erection time by two months.

Achievements like this have a familiar ring when prestressed concrete is used for virtually any kind of structure. Fireproofness, strength and extremely low upkeep are other advantages. In planning your next building, it will pay you to give prestressed your *first* consideration.

Roebling has led the way in developing and promoting prestressed's advantages from its early beginnings in this country. Besides the finest pretensioning materials, Roebling today can offer you a wealth of design data and practical experience unequalled in the prestressed industry. For constructive information on any aspect, contact Roebling's Construction Materials Div., Trenton 2, N. J.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

JFK Orders: 'No Discrimination'

- **Contractors on federal projects must provide equal job opportunities for all races.**
- **New executive order, to be policed by Labor Department, has stiff penalty provisions.**

General contractors and subcontractors working on federal construction projects will find themselves on a new tightrope April 5. That is the date on which the toughest directive ever issued by the White House against racial discrimination in employment becomes effective.

By a sweeping executive order President John F. Kennedy last week drastically revamped the present machinery for promoting equal job opportunities on federal work. In the case of government contracts, he deferred to management's right to manage and placed the burden of compliance on contractors, not on labor unions.

Under the new order, contractors, both prime and sub, will be faced with three situations quite different from those that existed before:

- The arsenal of weapons that can now be used against them for violations of the order include contract cancellation, blacklisting, public censure, court injunctions and criminal proceedings.
- Contractors will be required to submit compliance reports, setting forth their employment practices, policies and programs and disclosing their employment statistics. Compliance reports relating to performance under previous government contracts may be made a part of the bidding or negotiation of subsequent contracts.
- The order will be administered and policed, for all practical purposes, by the U.S. Labor Department, which has acquired both skill and experience in the investigation of labor law violations. Part of the contractual commitment obtained from contractors under the new order is an agreement that books, records and accounts will be available for inspection and use in investigations.

The basic commitment of contractors under the new order is not new. In essence, it is a declaration not to discriminate against any employee or job applicant because of race, color, creed or national origin. It applies to general contractors and subcontractors. It covers employment, upgrading, demotion, transfer, recruitment, layoff, termination, rates of pay and selection for training and apprenticeship. The commitment is to be written into all government contracts as a contractual obligation. Standard contract forms are now being revised by the General Services Administration.

Contractors who wish to avoid the red tape involved in the new order have a simple alternative—no bidding on government contracts.

Unlike the old order, which carried little but moral persuasion, the new one imposes a specific obligation on contractors to "take affirmative action" to see that the order is effective. No similar obligation is imposed on labor unions, which have frequetly been accused by minority groups of discrimination in both membership and apprenticeship practices. All that can be done to recalcitrant unions under the order is to make them the victims of private or public hearings and of the public censure that may result.

President Kennedy's approach, which may seem anomalous to some, is in line with the traditional concept of contract law. And it accommodates current statutory concepts of management rights and obligations, including the one that employers cannot abdicate their legal responsibilities. Federal labor law, as interpreted by the Mountain Pacific case, for example, places the responsibility for hiring and firing on management's shoulders, not on labor's. The Landrum-Griffin law makes employers jointly responsible for the administration of apprenticeship programs to which employer contributions can legally be made. And the Davis-Bacon Act makes contractors, not unions, responsible for the proper use of apprentices on federal projects.

The Kennedy approach also follows the recommendations of the AFL-CIO. Admitting that discrimination still exists within its ranks, the federation contends that the responsibility is not labor's alone. At its mid-winter meeting in Miami last month, the Executive Council said unions "do not control the basic hiring practices of management" and that "it is the employer who must be persuaded—and when necessary, required—to drop his discrimination policies." In fact, the union shop clause may become labor's most effective house-cleaning tool under the new Executive Order.

What President Kennedy has done under the order is to abolish two previously existing presidential committees—one on government contracts and one on government employment policies. They have been replaced by a new committee known as the President's Committee on Equal Employment Opportunity. Vice President Lyndon B. Johnson is chairman; Labor Secretary Arthur Goldberg is vice chairman with "general supervision and direction of the committee." The committee will be housed in the Department of Labor. With better facilities, tighter procedures and more effective enforcement machinery, the committee is expected to make more progress against discrimination than its predecessors. "I have no doubt that the vigorous enforcement of this order will mean the end of such discrimination," President Kennedy said.

As a practical matter, the new order may turn out to be less effective than it looks. That depends on how tough the committee decides to be. For the order is flexible enough to allow the committee to chart its own course and speed.

The AFL-CIO predicts that the order will meet with some resistance and concedes that "prejudices and century long practices cannot be wiped out overnight by decree." The executive order recognizes this, too. Most of the powers it conveys on the committee, including those relating to penalties and enforcement, are permissive rather than mandatory. And under the order, enforcement proceedings, such as contract cancellation and blacklisting, can be undertaken only after "conference, conciliation, mediation and persuasion" have failed.

The two big goals the order seeks to achieve, according to the President, are the payment of more than lip service to the constitutional principle of equality and more effective use of the nation's manpower resources. The need for the latter, perhaps significantly, is a thesis the Labor Department has been pushing vigorously in view of the population growth and anticipated changes in the size and complexion of the country's workforce.

OFFICIAL PROPOSALS

Bids: March 28, 1961

City of Hazleton

NOTICE TO CONTRACTORS

The City of Hazleton will receive sealed Proposals for the extension of an existing runway and for the expansion of an existing terminal apron upon its Municipal Airport in Hazle Township, Luzerne County, Pa. Proposals will be received by the undersigned until 7:30 P.M. (E.S.T.) March 28, 1961 at the office of the City Clerk, City Hall, Church Street, Hazleton, Pennsylvania, and will be publicly opened after 8:00 P.M. (E.S.T.) of the same day.

Copies of the Plans, Specifications and Proposal Forms can be obtained at the office of G. Edwin Pidcock Co., Consulting Engineers, 126 North Ninth Street, Allentown, Pa., upon payment of Forty Dollars ($40.00) for each set. Any Bidder, upon returning such set in good condition within ten (10) days after the opening of the Proposals, will be refunded Twenty-Five Dollars ($25.00) of his payment.

The work under this contract shall be done in accordance with the "Standard Specifications for Construction of Airports" (Federal Aviation Agency) as published by the United States Government Printing Office in June 1959. Copies of these Specifications can be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at a price of $2.75 each.

Each Bidder must deposit with his Proposal, a certified check or surety company's bid bond in an amount of not less than five (5) percent of the Total Bid as defined in the Instructions to Bidders.

Proposals must be submitted in duplicate on the prescribed forms provided and in accordance with the Instructions to Bidders. No Bidder may withdraw his Proposal within thirty (30) days after the actual date of the opening thereof. The City of Hazelton reserves the right to waive any informalities in, or to reject any or all Proposals, or portions thereof.

The minimum wages paid all labor employed on this project shall be as tabulated in the Specifications and as approved by the Secretary of Labor of the United States.

S. Thomas Capparell
Mayor, City of Hazleton

John H. Bigelow, Solicitor

Bids: March 30, 1961

State Department of Public Works Albany, N. Y.

NOTICE TO CONTRACTORS

Pursuant to the provisions of Highway Law, sealed proposals will be received until 10:30 a.m., Eastern Standard Time, on March 30, 1961, by Henry A. Cohen, Director, Bureau of Contracts, 12th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., for:

SOIL EXPLORATIONS AND FOUNDATION INVESTIGATIONS AT VARIOUS SITES ON NASSAU EXPRESSWAY, VAN WYCK EXPRESSWAY TO SOUTHERN STATE PARKWAY INTERCHANGE, QUEENS COUNTY, WHICH CONSTITUTES CONTRACT SPEC. NO. SM-181.

Maps, plans and specifications may be examined and obtained at the following offices:

(a) Bureau of Contracts, 12th Floor, The Governor Alfred E. Smith State Office Building, Albany 1, New York.
(b) Mr. Austin M. Sarr, District Engineer, New York State Department of Public Works, 325 West Main Street, Babylon, Long Island, New York.
(c) Mr. William Mende, Principal Building Construction Engineer, Department of Public Works, 270 Broadway, New York City.

The deposit for a set of plans, specifications and proposal forms is $5.00. Refunds of deposits for plans, specifications and proposals will be made only in case the deposits of individual sets are $10.00 or more, per Chapter 835, Laws of 1960.

The Engineer's Estimate of cost for this work is $61,400.00.

Proposal for this contract must be submitted in separate sealed envelope with the name of the contract plainly endorsed on the outside of the envelope. Proposal must be accompanied by draft or certified check, payable to the order of the "State of New York, Commissioner of Taxation and Finance" for the sum of $3,200.00. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Law as set forth in "Instruction to Bidders."

The right is reserved to reject any or all bids.

J. BURCH McMORRAN
SUPERINTENDENT OF PUBLIC WORKS

Bids: March 24, 1961

Delaware Memorial Bridge Repainting Steelwork

DELAWARE INTERSTATE HIGHWAY DIVISION
CONTRACT NO. 44
NOTICE TO BIDDERS

Sealed proposals for repainting steelwork on the portion of the Delaware Memorial Bridge from the west abutment to the west tower, exclusive of the tower, cables and suspenders, at New Castle, Delaware, will be received by the Delaware Interstate Highway Division at the Administration Building, Delaware Memorial Bridge, near Wilmington, Delaware, until 11:00 A.M., Eastern Standard Time, on March 24, 1961 at which time and place said proposals will be opened and read.

Repainting shall consist of cleaning metal surfaces, spot-priming where necessary, and applying one (1) finish coat of paint to all exposed metalwork.

The approximate weight of steelwork to be painted is 10,350 tons.

Work on this project shall begin within ten (10) days after the execution of the Contract and shall be completed on or before October 1, 1961.

Monthly payments will be made for ninety (90) per cent of the work completed each month.

Bidders must submit proposals upon forms provided by the Division.

Each proposal must be accompanied by an acceptable surety bond, certified check or cash in the amount of at least ten (10) per cent of the total amount of the proposal.

The Contract will be awarded or proposals rejected within thirty (30) days from the date of opening proposals. The right is reserved to reject any or all bids.

One set of the contract documents may be obtained from the Delaware Interstate Highway Division at the Administration Building, Delaware Memorial Bridge near Wilmington, Delaware, after March 3, 1961, upon payment of $10.00. Contract documents need not be returned and the above payment will not be refunded. Checks shall be made payable to Howard, Needles, Tammen & Bergendoff.

Delaware Interstate Highway Division
By: J. H. Tyler McConnell, Director
Richard A. Haber, Chief Engineer
Delaware Interstate Highway Division
March 3, 1961.

District of Columbia—Highway Construction—Dept. of Hwys. & Traffic, D. C., Mar. 2, 1961. PAVING ANACOSTIA FREEWAY, CHESAPEAKE ST. TO D. C. LINE, FEDERAL AID INTERSTATE PROJECT NO. I-295-2(21)0, Invitation No. C-6173-H, consisting of approx. 41,481 tons Plant Mix Aggregate Base Course; 4,461 tons Asphalt Concrete Surface Course Class C; and 11,012 sq. yds. Reinf. Portland Cement Concrete Pavement. (Wage rates have been predetermined by Labor Dept.) Bid forms, plans and specifications are now available from Supervisor, Bid & Contract Division, Procurement Office, D. C., Room 404, 499 Pennsylvania Ave., N.W., upon deposit of a certified check for $60.00 per set, payable to D. C. Treasurer. (Phone NA 8-6000, Ext. 448). SEALED BIDS to be opened 3:00 PM, EST, Mar. 30, 1961, in Rm. 424, 499 Pa. Ave., N.W.

U. S. Government

DEPARTMENT OF THE INTERIOR Bureau of Reclamation. Sealed bids (Specifications No. DC-5544) will be received at Farmington, New Mexico, until 10 a.m., Mountain Standard Time, April 18, 1961, for furnishing labor and materials for Hammond Pumping Plant and Penstock, Bypass, and Discharge Lines, Hammond Project, New Mexico. Location 25 miles south of Aztec, New Mexico in San Juan County. Principal items are 57,000 cu. yds. excavation; Lump Sum — Constructing pumping plant superstructure; 400 cu. yds. concrete; and other work. Completion time 350 days. For particulars, address Bureau of Reclamation, P. O. Box 28, Farmington, New Mexico; P. O. Box 360, Salt Lake City, Utah; or Building 53, Denver Federal Center, Denver 25, Colorado. Floyd E. Dominy, Commissioner.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-5540) will be received at Rock Springs, Wyoming, until 10 a.m., Mountain Standard Time, April 13, 1961, for furnishing labor and materials for Residences for Government Community at Fontenelle Dam, Seedskadee Project, Wyoming. Location about 59 miles northwest of Green River, Wyoming. Principal items are Lump Sum—Constructing 8 three-bedroom residences, complete except for storm windows and combination storm doors; Lump Sum—Constructing 2 two-bedroom residences, complete except for storm windows and combination storm doors; and other work. Completion time 180 days for the first five residences and 240 days for the remainder of the work. For particulars, address Bureau of Reclamation, P. O. Box 360, Salt Lake City, Utah; P. O. Box 944, Rock Springs, Wyoming; or Building 53, Denver Federal Center, Denver 25, Colorado. Floyd E. Dominy, Commissioner.

Department of Commerce, Bureau of Public Roads, March 2, 1961. SEALED BIDS will be received at the office of H. T. Gorschboth, Division Engineer, Bureau of Public Roads, First National Bank Building, Florence, Alabama, until 10:00 a.m., C.S.T., APRIL 4, 1961, for Project 3F20-3G19, Natchez Trace Parkway, Chickasaw, Webster and Clay Counties, Mississippi. Hot Bituminous Concrete Pavement, Stabilized Shoulders and other work from Mississippi Highway 32 to Mississippi Highway 15. Length: 24.733 miles. The approximate quantities of the more important items are: 30,000 tons Gravel Material for Stabilized Shoulders and 48,000 tons Hot Bituminous Concrete Pavement. Minimum wage rates have been fixed as required by law. Plans, specifications and bid forms are available upon request at the address given above or Bureau of Public Roads, Fourth Floor, Anderson Building, 450 West Broad Street, Falls Church, Virginia. F. W. Cron, Regional Engineer.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-5541) will be received at East Wenatchee, Washington, until April 13, 1961, for furnishing labor and materials for Earthwork, Pipelines and Structures including Pumping Plants, Laterals 1 through 10 and Sublaterals, East Unit Lateral System, Chief Joseph Dam Project. Location near Wenatchee, Washington. Principal items are 35 miles of pipelines with diameters varying from 14 to 27 inches; pipe options are precast concrete, asbestos-cement and mortar-cement steel pipe; 121,000 cu. yds. excavation; Furnish and install 8 pumping units complete with mechanical and electrical appurtenances; and other work. Completion time 550 days. For particulars, address Bureau of Reclamation, P. O. Box 0219, East Wenatchee, Washington; P. O. Box 937, Boise, Idaho; or Building 53, Denver Federal Center, Denver 25, Colorado. Floyd E. Dominy, Commissioner.

Read the Official
Proposal Columns of ENGINEERING NEWS-RECORD
This Week and Every Week

OFFICIAL PROPOSALS

Bids: March 29, 1961

NOTICE TO CONTRACTORS: STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.—Pursuant to the provisions of the Highway Law, and special provisions for projects financed with Federal Aid Funds, sealed proposals will be received until ten-thirty o'clock A.M., eastern standard time, on the 29th day of March, 1961, by Henry A. Cohen, Director, Bureau of Contracts, 12th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., for the following projects:

County	Contract No.	Name	Miles	Type	Deposit	Estimated Cost of Work
DISTRICT No. 1, N. F. Ronan, Act. District Engineer, 353 Broadway, Albany 1, New York						
Essex, Clinton, (Rtes 9 & 86)	R.C. 61-18	Jay-Lake Placid. Pt. 1, SH 5540 (Br. No. 1) Plattsburg-Ausable Chasm, Pt. 2, SH 5311 (Br. No. 2)	0.15	Repair to Bridges	$1,000 Plans $5	$17,000
Sara.	P.A. 61-1	Geyser Creek Picnic Area (Saratoga Springs Reservation)	0.36	Grading, Paving, Water Supply Drainage & Misc. Work	$2,800 Plans $5	51,000
Warren (Int. Trg. Rte. 87)	FISH 61-3	Interstate Rte. 502 (Gurney Lane to Luzerne Road) Proj. I-87-3(37)	3.57 (3.28 Acc.)	9" Cem. Conc. Pavt. 2 @ 24' Var.=3.24 Mi. Misc. Work=0.33 Mi. Acc.-1.47 Mi. Cem. Conc. Pavt.; 0.38 Mi. Asph. Conc.; 1.43 Mi. Bit. Treat. Fdn. Course; 2 Hgs. Comp. WF Beam Brs. 3 Sps. 159' TOT; 3 Sps. 213' TOT.	$227,000 Plans $5	3,953,000
DISTRICT No. 2, L. Ketchum, District Engineer, 109 No. Genesee Street, Utica 1, New York						
Fulton, Herkimer (Rte. 29)	R.C. 61-29	Oppenheim-Dolgeville SH 5626 (Over East Canada Creek) Bridge No. 1	....	Cleaning and Painting Bridge Thru Truss—1 Span 182'	$190 Plans $5	3,250
DISTRICT No. 3, E. E. Towlson, District Engineer, 333 E. Washington Street, Syracuse, New York						
Cort. (Rte. 13)	R.C. 61-20	Cortland-Truxton, S.H. 738	5.01	Asphalt Concrete	$12,000 Plans $5	$206,000
Onon. (Int. Trg. Rtes. 690, 81)	FITS 61-9	Interstate Rte. Conn. 570 (State Fair Boulevard) FAC 56-8P (Northwest Art. Conn.) FASH 56-6P Interstate Rte. 505 (Nedrow-Lafayette) FISH 56-12 (Lafayette-Tully) FISH 56-11 Proj. I-690-3(8); I-81-2(55)	13.68 (6.85 Acc.)	Traffic Signs and Delineators.	$11,000 Plans $5	192,000
Onon. (Int. Trg. Rte. 81)	R.C. 61-35	Interstate Rte. 505 (Mattydale-Brewerton, FASH 57-6)	0.15	Roadside Development	$300 Plans $5	5,000
Oswego (Rte. 69)	R.C. 61-6	Parish-Camden, Pt. 1, SH 5526	2.27	Asphalt Concrete	$15,000 Plans $5	265,000
Seneca (Rte. 96)	FARC 61-30	Waterloo Village (Fayette St.) SH 1399, Waterloo Vill. SH 1211 Waterloo Vill. SH 1211A Proj. F-626(7)	0.47	Asph. Conc. Widen. Brs. Br. No. 1 I-Beam, 1 Sp. 73.5' C. to C. of Bear. Br. No. 2 Prestress. Conc. 3 Sps. 86' TOT. Br. No. 3 Prestress. Conc. 2 Sps. 100' TOT.	$25,500 Plans $5	463,000
DISTRICT No. 4, B. F. Perry, District Engineer, Barge Canal Terminal, Rochester, 1 New York						
Liv. (Rte. 15A)	R.C. 61-26	Hemlock-Lima, S.H. 1951	5.87	Asphalt Concrete	$31,000 Plans $5	550,000
Mon. (Rte. 104)	R.C. 61-23	Little Ridge, Part 5, S.H. 760	3.85	Asphalt Concrete	$20,000 Plans $5	358,000
Mon. (Rte. 260)	R.C. 61-21	Sweden-Walker, S.H. 1391	6.18	Asphalt Conc.=5.98 Mi. Misc. Work=0.20 Mi.	$25,000 Plans $5	449,000
Mon. (Rte. 33)	R.C. 61-27	Buffalo, Pt. 5, S.H. 634	2.11	Asph. Conc.=2.00 Mi.	$8,000 Plans $5	136,000
Ont. (Rtes. 96, 251)	R.C. 61-28	Pittsford-Victor, Pt. 2, S.H. 8223; Victor-Mendon, Pt. 1, S.H. 335	2.57	Asph. Conc.=2.54 Mi. Misc. Work=0.03 Mi.	$10,000 Plans $5	177,000
Wyom. (Rte. 78)	FARC 61-2	Java Center-Waldo Cors.-Smith Corners, S.H. 1716 Java Center-Java Village, S.H. 894 Proj. F-1158(2)	5.95	Asph. Conc.=5.81 Misc. Work=0.14	$43,000 Plans $5	792,000
DISTRICT No. 5, E. G. H. Youngmann, District Engineer, State Office Bldg., 65 Court Street, Buffalo 2, New York						
Erie	SCE 61-1	Seajaquada Creek Expressway (Niagara St. to Delaware Ave.)	1.91 (1.95 Acc.)	Roadside Development	$3,500 Plans $5	64,000
Erie (Rte. 20A)	FARC 61-5	Orchard Park-East Aurora, S.H. 1066 Proj. F-1054(5)	5.02 (0.12 Acc.)	9" Cem. Conc. Pavt.=5.03 Mi. Misc. Work=0.11 Mi.	$85,000 Plans $5	1,500,000
Niag. (Int. Trg. Rte. 190 & Rte. 18)	FINIE 61-1P FARC 61-33P NIE 61-2P	Interstate Rte. 506 (Niagara Expressway) Contract 3 Suspension Br.-Lewiston, S.H. 475, Access "Ramp L" (Relocation of Lewiston Rd.) Proj. I-190-1(38), U-461(13)	0.86 (2.09 Acc.)	9" Cem. Conc. Pavt.=0.41 Mi. Grading, Misc. Work=0.45 Mi.; Access=1.86 Mi. Cem. Conc; 0.07 Mi. Asph. Conc.; 0.16 Mi. Grading & Misc. Work Comp. I-Beam Struct. 4 Sps. 279' TOT.	$85,000 Plans $5	1,542,000
Niag. (Int. Trg. Rte. 190)	FINIE 61-3	Interstate Route 506, Niagara Expressway—Cont. 4 (Gill Creek to Cemetery Rd.) Proj. I-190-1(39)	2.04 (0.98 Acc.)	Cem. Conc. Pavt.=1.96 Mi. Misc. Work=0.08 Mi. Access=0.59 Mi. Cem. Conc; 0.39 Mi. Asph. Conc. Hgs No. 9, 2 Comp. I-Beam Brs., 1 Span @ 75.1', 1 Sp. @ 75.1' Hgs No. 8, Rehabilitating Bridge	$132,000 Plans $5	2,400,000
DISTRICT No. 6, Wm. J. Dennis, District Engineer, State Office Bldg., 30 West Main Street, Hornell, New York						
Steuben (Rte. 432)	FARC 61-24	Addison-Rathbone, SH 1598 Proj. S-580(1)	0.76	Asph. Conc.=0.63 Mi. Misc. Work=0.13 Mi. Br. No. 1 Twin Reinf. Conc. Closed Box, 23.1' Span	$11,000 Plans $5	199,000
DISTRICT No. 7, R. W. Sweet, District Engineer, 444 Van Duzee Street, Watertown, New York						
Clint., Essex (Int. Trg. Rte. 87)	FISH 61-8	Interstate Rte. 502, Sects. 7A1 and 7A2, (Rte. 9 to Rte. 22) Proj. I-87-4(18)	2.76 (1.79 Acc.)	Asph. Conc. Type 1A 1-Hgss Comp. Beam, 4 Sps. 227.2' TOT., 2 Brs. Welded Steel Plate Girder, 3 Sps. 319' TOT. 5 Hgss Prestress. Conc., 3 Sps. 139.4' TOT., 3 Sps. 151.3' TOT., 3 Sps. 121.5' TOT., 3 Sps. 121.8' TOT., 6 Sps. 351.3' TOT.	$220,000 Plans $10	4,033,000
Jeff. (Rte. 11)	R.C. 61-19	Watertown-Philadelphia, Pt. 1C, S.H. 5681, Watertown-Phila. Pt. 2, S.H. 5617	2.20	Asphalt Conc. Type 1A	$3,400 Plans $5	62,000
DISTRICT No. 8, K. C. Rauer, District Engineer, Pleasant Valley Rd., Poughkeepsie, New York						
Rock., Orange	SLP 61-1	Seven Lakes Parkway (Sloatsburg to Kanawauke Circle)	6.34	Asphalt Concrete 2 Brs., Comp. I-Beam 1 Sp 68.15', 1 Sp. 48.31', Alterations to Dam Bridge	$147,000 Plans $5	2,672,000
Ulster (Rte. 28)	FASH 61-9 FARC 61-32	Kingston By-pass Pt. 1 (Route U.S. 209 to Rte. N.Y. 28) Kingston-West Hurley, S.H. 5173 Proj. F-FG-U-395(7), F-1009(5)	5.40 (1.73 Acc.)	9" Cem. Conc. Pavt. (Main Line)=4.57 Mi. Cem. Conc. Pavt. (Ramps)=1.47 Mi. Asph. Conc.=0.76 Mi., Bit. Dble Surf. Treat.=0.26 Mi. Misc. Work=0.07 Mi., 2 Hgss Comp. I Beam, 1 Sp. 78.4', 4 Sps. 226.80' TOT.; Welded Plate Gird. Br., 2 Sps. 275' TOT.	$260,000 Plans $5	4,560,000
West.	SBP 61-1	Sprain Brook Parkway Tuckahoe Road to Jackson Ave.	2.60 (3.45 Acc.)	8" Cem. Conc.=2.54 Mi., Misc. Work=0.06 Mi. Access=0.65 Mi. Cem. Conc. and 2.80 Mi. Asph. Conc.; Reinf. Conc. Closed Box Culvert WF Comp. Beam, 1 Sp. 52.5' Retaining wall	$220,000 Plans $5	4,092,000
West. (Int. Tr. Rte. 287)	FICWETC 61-1	Int. Rte. Conn. 520, Cross Westchester Expressway Project I-287-2(21)	....	Traffic Signals	$7,000 Plans $5	123,000
West. (Rte. 9)	R.C. 61-17	Broadway-Mt. Pleasant, S.H. 9206; Briarcliff Manor Village, SH 5361; Ossining-Croton River, SH 5364A; Ossining Village, S.H. 5482	3.35	Asphalt Concrete	$13,000 Plans $5	224,000
DISTRICT No. 10, A. M. Sarr, District Engineer, 325 W. Main Street, Babylon, L.I., New York						
Kings. (Int. Trg. Rte. 278)	FIGE 61-1	Interstate Rte. Conn. 512 Gowanus Expressway-Cont. 3 (2nd. Ave. to 20th St. Incl. Prospect Expressway Interchange) Proj. EI-278-1(60)	0.66 (0.31 Acc.)	Main Line: Reinf. Conc. Slab Roadway (Struct.)= 0.30 Mi.; Grade Drain. & Misc. Work=0.36 Mi., Surf. Sts. Grade. Drain, & Misc. Work=0.31 Mi. Incl. Elev. Structure & Prospect Exp. Inter.	$350,000 Plans $10	6,458,000
Nassau (Rte. 25)	FARC 61-31	Jericho Turnpike, SH 9020 Mineola Village-Jericho Turnpike, SH 1785 Mineola Village-Jericho Turnpike, S.H. 8493 Mineola Village- Jericho Turnpike, SH 1785A Proj. U-1000(10)	2.40	Asph. Conc.=1.97 Mi., Misc. Work=0.43 Mi. Traffic Signs & Signals	$92,000 Plans $5	1,665,000
Nassau, Suffolk	FALIETS 61-1	Long Island Expressway-Cont. 7A (So Oyster Bay Road to Nassau Suffolk County Line) Proj. U-862(31)	3.61 (4.04 Acc)	Traffic Signs	$6,500 Plans $5	118,000
Nassau, Suffolk	FALIETC 61-2	Long Island Expressway, Cont. 8A (Nassau-Suffolk Co. Line to Deer Park Ave., FALIE 60-1, FALIE 60-2) Proj. U-862(33)	6.04 (9.78 Acc.)	Traffic Singals, Signs and Delineators	$8,000 Plans $5	144,000
Nassau	NSPRC 61-2	Northern State Parkway (N.Y.C. Line to Long Island Expressway)	5.24	Asphalt Concrete=5.10 Mi. Misc. Work=0.14 Mi.	31,000 Plans $5	562,000
Nassau, Suffolk	O.P. 61-2	Ocean Parkway (Meadowbrook State Parkway-Captree State Parkway)	15.37	Shoulder Widening and Landscaping=14.83 Mi. Misc. Work=0.54 Mi.	30,000 Plans $5	502,000

(Continued on page 82)

OFFICIAL PROPOSALS

(Continued from page 81)

Any projects in this letting that are on the Federal Aid highway systems are subject to the provisions of the "Federal-Aid Highway Act of 1956", being Public Law 627, 84th Congress, approved June 29, 1956, and are also subject to the applicable New York State statutes.

In compliance with the provisions of Section 115 (Prevailing Rate of Wage), Public Law 627, the minimum wages to be paid laborers and mechanics are included in wage schedules that are set out in the bid proposal.

Maps, plans, specifications and proposal forms may be seen and obtained at the office of the State Department of Public Works, Bureau of Contracts, Albany, N. Y., and at the office of the District Engineers noted above, and may also be seen at the office of the State Department of Public Works, 270 Broadway, New York City.

If the deposit is $10.00 or more, full refund for one copy of the plans and specifications will be made to a bidder for the particular project, if such plans and specifications are returned in good condition within 30 days after the award of the contract or after the rejection of the proposal. The successful bidder is not required to return the copy of the plans and specifications in order to be entitled to such refund. If the deposit is $10.00 or more, partial refund will be made for the return of all other copies of plans and specifications in good condition within 30 days after the award of the contract or the rejection of the proposal.

Special attention of bidders is called to "Information for Bidders" in the Public Works Specifications, and to the special provisions applying to projects financed with federal funds. Award of a contract is subject to priorities and allocations under the Defense Production Act of 1950, as Amended, and all regulations issued thereunder.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by draft or certified check payable to the order of the "State of New York, Commissioner of Taxation and Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bond shall conform to the provisions of the Highway Laws, as set forth in "Information for Bidders".

The right is reserved to reject any or all bids.

J. BURCH McMORRAN
SUPT. OF PUBLIC WORKS

Bids: March 30, 1961

New Jersey Turnpike Authority

NEW BRUNSWICK, N. J.
ADVERTISEMENT FOR PROPOSALS
CONTRACT NO. R-98

Proposals are invited for Contract No. R-98 which involves furnishing and erecting five (5) new antenna towers; dismantling and erecting an existing antenna tower; changes and additions to existing radio tower antenna system; furnishing two (2) prefabricated steel buildings; and other incidental work all along the entire length of the New Jersey Turnpike.

Proposals will be received at the New Jersey Turnpike Authority Administration Building, New Brunswick, New Jersey, until 11:00 o'clock, Eastern Standard Time, on the morning of March 30, 1961, at which time and place said proposals will be publicly opened and read.

Contract documents may be examined during office hours on or after March 9, 1961, at the office of the Authority, and will be furnished upon payment of Ten Dollars ($10.00) for each set, not refundable.

NEW JERSEY TURNPIKE AUTHORITY
Joseph Morecraft, Jr., Chairman

March 3, 1961
R-98

READ THE OFFICIAL
PROPOSAL COLUMN OF
ENGINEERING NEWS-RECORD
THIS WEEK AND EVERY WEEK

(Continued on page 90)

EMPLOYMENT NATIONAL COVERAGE OPPORTUNITIES

DISPLAYED RATE:

The advertising rate is $45.20 per inch for all advertising appearing on other than a contract basis. Frequency rates quoted on request.

An advertising inch is measured 7/8" vertically on a column—3 columns—30 inches to a page.

Subject to Agency Commission.

MARCH 30TH ISSUE CLOSES MARCH 20TH

UNDISPLAYED RATE:

$2.70 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Position Wanted ads take ½ of above rate.

Box numbers—count as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions

Not subject to Agency Commission.

Send NEW Ads and Inquiries to Classified Advertising Division of ENGINEERING NEWS-RECORD, P. O. Box 12, N. Y. 36.

Pennsylvania's Long-Range Highways Expansion Program Offers Permanent Positions and Challenging Opportunities to

GRADUATE CIVIL ENGINEERS WITH EXPERIENCE IN

- LOCATION
- HIGHWAY DESIGN
- BRIDGE DESIGN
- TRAFFIC
- MATERIALS
- CONSTRUCTION

Salaries from $6,000 to $12,000, based on qualifications.

• Growth potential • Civil Service security • Fringe benefits

For particulars, write RECRUITMENT SECTION, ROOM #418, PENNSYLVANIA DEPARTMENT OF HIGHWAYS, HARRISBURG, PA.

ADDRESS BOX NO. REPLIES TO: Box No. Classified Adv. Div. of this publication. Send to office nearest you.
NEW YORK 36: P. O. Box 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 11: 255 California St.

• *POSITIONS VACANT*

Construction Supervision. Construction engineer for inspection and supervisory work on electric power lines and substations. Opportunity for permanent employment and advancement with well-known consulting engineering firm. Send resume to P-6005, Engineering News-Record.

Electrical Engineer familiar with electric power systems. Permanent employment with opportunity for advancement in long-established consulting engineering firm. Write or call Stanley Engineering Company, Muscatine, Iowa.

Soils Engineer. Graduate Civil Engineer with field experience in foundation investigation, testing, and laboratory management. Will supervise field exploration and soils laboratory testing for highway construction. Required to analyze field information and test data to develop design criteria and recommend construction technique. Salary, to be negotiated depending on experience. Location, Intermountain West. P-6187, Engineering News-Record.

Structural Engineer-Midwest consulting firm seeks Ph.D. to design complex steel structures, reinforced and prestressed concrete. Preference will be given to applicants with practical experience. Permanent position with established firm in business since 1929. Moving expenses paid. Send resume, including education, experience, and personal qualifications to P-6245. Engineering News-Record.

Principal Civil Design Engineer. Pacific N. W. office of national firm has senior supervisory position for grad. registered professional engineer with ten to fifteen years experience, in design of hydro-electric projects. Arch dam structural experience is desirable. Send resume to R. W. Beck and Associates, attention of Norman R. Carson, 1500 Tower Building, Seattle, Washington.

Construction Supervision needed for 1-2 year project in Caribbean area. Minimum of ten years experienced in chemical plant or refinery construction. Knowledge of Spanish essential. Forward resume of experience together with present salary requirement and availability date to: T. F. Howard, Girdler Corporation, P. O. Box 174, Louisville 1, Kentucky.

• *POSITIONS VACANT*

Field Manager:—A Leading West Coast Contractor has an opening for a top man with 15 years or more experience in highway, irrigation and earthfill dam construction. A portion of this experience must have been in the Western States. Applicant must have been part of a construction company management team during recent years. Responsibilities will include administration of all field operations, personnel and equipment, and collaboration on all estimates. Salary is open—excellent opportunity for the right man. P-6261, Engineering News-Record.

Assistant City Engineer—City of Elmira, New York. Degree in Civil Eng. and min. of 3 years experience required; some traffic eng. exp. preferred. Salary range $472-$576/mo. Send resume to W. Wasserstrom, Sr. Eng., Bur. of Eng., City Hall, Elmira, New York.

Structural Engineer—MS or PhD to conduct design and experimental studies of a variety of structures. Challenging and varied problems involving the application of high strength and constructional alloy steels. Experience not required but applicant should have a thorough understanding of structural behavior. Large research laboratory, Western Pennsylvania. Submit resume and salary requirements to P-6309, Engineering News-Record.

Assistant City Engineer, age 30 to 55, must have engineering degree and be a registered engineer or eligible for registration in North Dakota. Salary range $561.00 to $680.00, with fringe benefits. Write City Auditor, City Hall, Grand Forks, North Dakota, for application blanks.

Resident Engineer—Experienced on Sewage Treatment Plants or similar work. Two year project in New York Metropolitan area. Give experience, salary desired and date available. P-6321, Engineering News-Record.

(Continued on page 84)

EMPLOYMENT PROBLEM?

When you are in need of specialized men for specialized jobs, contact them through an employment ad in this publication.

APPRAISAL ENGINEER

We seek a highly competent individual who has an interest in, and aptitude for, making valuation and appraisal studies covering all or a part of the assets of a corporate entity.

The work involves specialized knowledge in the field of corporate purchases, mergers, consolidations, sales, condemnations, severance damages, depreciation, mortgages and property record systems.

Applicant should possess a minimum of 10 yrs. exp. in the responsible handling of a substantial variety of valuation and appraisal functions.

Formal education should include a college degree in engineering supplemented by a working knowledge of accounting and statistics.

Salary commensurate with qualifications. Submit complete resume in confidence.

P-6209, Engineering News-Record Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

ENGINEERING COST ESTIMATORS

The Chemstrand Corporation, manufacturers of Acrilan® and Chemstrand nylon, needs engineers experienced in the following:

- **Construction and Project Cost Estimating**
- **Construction Scheduling**
- **Cost Analysis and Controls**

Bachelor's degree in engineering (preferably chemical or mechanical specialization) required, with a minimum of 5 years of engineering experience in the above activities related to the design and construction of major chemical and/or synthetic fiber facilities. Occasional travel and temporary duty assignments at project sites involved.

Excellent benefit plans. Salaries commensurate with training and experience.

Send resume of background including salary history and requirements in confidence to:

Manager, Employment—Recruitment
Box ED 18

THE CHEMSTRAND CORPORATION
Decatur, Alabama

Design and Development Engineer

Intermediate Grade

A leading manufacturer of automatic temperature controls in northern Chicago suburb is seeking a graduate mechanical engineer from accredited university with 2 to 3 years experience in design and development of pneumatic or hydraulic flow controls, valves, recording and controlling instruments or small mechanical devices. He should be an imaginative, individual with sound mechanical aptitude and a knowledge of manufacturing problems, methods and processes.

In return we offer good salary, opportunity for advancement, generous fringe benefits, profit sharing retirement plan, attractive working conditions and professional prestige.

Please send a resume describing your education, experience, accomplishments, personal information and salary.

Write R. G. Steckel

The Powers Regulator Co.
3400 Oakton St., Skokie, Ill.

HIGHWAY ENGINEERS
FOR
SOUTH AMERICAN PROJECTS

Extensive programs require high calibre experienced personnel to act in consulting capacity to highway departments. Openings exist for those with proven competence in the following fields:

Location
Construction (Resident)
Bridges
Soils and Materials
Equipment (Maintenance and training)

Applicants must be under 50, in good physical condition and have a working knowledge of Spanish. Two year contract with possibility of extension. Qualified applicants will receive immediate reply.

Send complete detailed experience record and personal data to—

E. H. Blaschke,
Brown and Root, Inc.,
P.O. Box 3,
Houston 1, Texas

ENGINEERS

CIVIL
ELECTRICAL
MECHANICAL

Overseas positions for graduate engineers with a minimum of five years experience on power house construction on a Multi-Purpose dam in Thailand. Civil experience should include supervision of construction on buildings preferably power houses. Electrical and Mechanical experience should include installation of penstocks, radial gates, fixed wheel gates, hydraulic turbines and governors, and the electrical and mechanical features of switch gear.

Positions feature 24 month contracts, living quarters furnished, medical care and insurance, one month vacation per year.

Submit complete resume to:

SVERDRUP & PARCEL
AND
ASSOCIATES, INC.
915 Olive Street, St. Louis 1, Mo.

"Put Yourself in the Other Fellow's Place"

TO EMPLOYERS

TO EMPLOYEES

Letters written offering Employment or applying for same are written with the hope of satisfying a current need. An answer, regardless of whether it is favorable or not, is usually expected.

MR. EMPLOYER, won't you remove the mystery about the status of an employee's application by acknowledging all applicants and not just the promising candidates.

MR. EMPLOYEE you, too, can help by acknowledging applications and job offers. This would encourage more companies to answer position wanted ads in this section. We make this suggestion in a spirit of helpful cooperation between employers and employees.

This section will be the more useful to all as a result of this consideration.

Classified Advertising Division

McGraw-Hill Publishing Co., Inc.
330 West 42nd St., New York 36, N. Y.

CONSTRUCTION SUPERINTENDENT

Heavy, highway and street construction. Location —Southern New York State. Civil Engineering Degree preferred. Chance for advancement with growing firm.

P-6162—Engineering News-Record Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y

• POSITIONS VACANT

(Continued from page 82)

Permanent Position: Structural engineer with at least an M.S. degree from well recognized engineering school. Well grounded in the Theory of Elasticity to handle complex indeterminate structures. Excellent living conditions, good future for young and responsible engineer. Submit Graduate School credits. Location, North Carolina. P-6338, Engineering News-Record.

Contracts Administrator. Salary Range: $617- $749 per month. Appointment may be made above the entrance rate. Responsibility for detailed preparation of contract documents involving the architectural and engineering design agreement. Reviews and analyzes bids. College graduation, major in Architecture or Structural Engineering plus five years of architectural experience. Eligibility to acquire Nevada license to practice Architecture. Excellent fringe benefits. Location ideal. Climate—Tops. Hunting, fishing, skiing plus numerous other recreational activities. Apply: Nevada State Personnel Department, Carson City, Nevada.

Superintendent experienced in Construction of Water Plants, Sewage Plants and Power Plants required by large Midwest General Contractor. Salary range $12,000-$14,000. Send resume of experience, availability and willingness to relocate to P-6324, Engineering News-Record.

• EMPLOYMENT SERVICES

Better Positions—$6,000 to $35,000. Want a substantial salary increase, more opportunity or different location? This national 50 year old service connects you with best openings. You pay us only nominal fee for negotiations: This we refund when employer pays placement fee. Present position protected. In complete confidence, write for particulars. R. W. Bixby, Inc., 659 Brisbane Bldg., Buffalo, N. Y.

• POSITIONS WANTED

Const. Supt.-All phases of grading and bridge construction, state and federal projects. Complete job management. PW-6254, Engineering News-Record.

Construction Superintendent—over 30 years experience all types road construction and paving. PW-6192, Engineering News-Record.

Construction Manager, Registered Civil Engineer, mature, broad experience in estimating, bidding, contract negotiation, organization, administration, operation, and closeout of large construction projects, domestic and foreign. Expect to complete present assignment June 1961. Desire connection with large volume construction organization, preferably one doing business in southern or southwestern United States, but will consider foreign assignment. Detailed experience record and references furnished upon request. PW-6234, Engineering News-Record.

Construction Manager-Estimator-C. E.-age 40. Experienced as manager of commercial, industrial and heavy construction from bid to completion. Available. Will relocate, travel, invest. PW-6227, Engineering News-Record.

Master Mechanic, Eqpt. Supt. or Service Manager twenty-five years as supervisor of repairs, maintenance and operation of heavy equipment. Best of references, available immediately. PW-6243, Engineering News-Record.

Asst. Proj. Mgr., BCE, PE 10 yrs. exp. highways & housing. G. C. and Engrs. NYC area. Desires work where ability and drive will be utilized. PW-6222, Engineering News-Record.

General Project Manager & Contract Administr. 22 yrs. heavy constr. major projects U. S. & O. S. negotiations to completion. PW-6292, Engineering News-Record.

Bldg. Const. Engr, B. S. Rensselaer Poly. Inst. 1953. Available about April 16, 1961. Four years military const. experience. Presently Plant Engr cement plant. Silo const. experience. PW-6273, Engineering News-Record.

Maintenance & Construction Supervisor— Oil refineries & petro-chemical plants. 23 years experience—mostly foreign. Speak Spanish. PW-6269, Engineering News-Record.

Civil Engineer, BSCE, PE, Age 38, 15 years highway experience. Desire southern location. PW-6302, Engineering News-Record.

Foreman, excavating, grading, pipe drainage. PW-6224, Engineering News-Record.

• POSITIONS WANTED

Proj. Eng., B. S. C. E., 31, 8 yrs. heavy const. exp. Desire challenging position with a future. Relocate anywhere. PW-6300, Engineering News-Record.

Senior Engineer and Inspector-Exceptional background in inspection, expediting and material control work on multi-million dollar projects-foreign and domestic. Inspections in over 500 major U. S. manufacturing plants utilizing up-to-date techniques including x-ray, magnetic particle and electronic devices. Available on contract or salary basis. Take complete charge material coordination, inspection and/or expediting or available for supervisory position on foreign construction projects. L. E. Parker, 666 No. Terrace Ave., Mount Vernon, New York.

Superintendent-20 years experience on sanitary and storm sewers. Capable of complete charge. Prefer Northeast. PW-6239, Engineering News-Record.

Registered Professional Civil Engineer and Land Surveyor, B.S.C.E., M.S.C.E. Min. salary $9000 a year. Resume upon request. PW-6315, Engineering News-Record.

Project Engineer with diversified experience, about 12 years, of Design, Construction-Supervision, Contract Administration. Reports and specifications for bldgs, highways, dams, etc. Specializes in foundation problems and materials laboratory supervision. P. E. Licenses & M.S. degree, 42. Desires responsible position preferably with consulting engineers. Any location. Available this spring at end of overseas assignment. PW-6328, Engineering News-Record.

B.S.C.E. Age 37, 10 yrs experience supervision Power industry also exp highway & bridge engr. Prefer South or Midwest. Desire permanent loc. PW-6312, Engineering News-Record.

Engineering Administrator — Construction Manager — Project Engineer — Professor; 23 yrs experience all phases; Reg. P.E.; F. ASCE; seeks responsible affiliation with consulting, construction firm, or college. South or Southwest. PW-6333, Engineering News-Record.

Const. Supt. Sr. Hirise specialist housing, commercial. Reliable. Avail. now. PW-6331, Engineering News-Record.

Controller—CPA, Top G.C. exp. 20 million yrly. program. Costs, budgets, sub-contract negot. PW-6335, Engineering News-Record.

• POSITIONS WANTED

Structural Engineer, Ph.D., P.E. 15 years design & supervision exp. in steel, concrete, buildings, bridges, industries, foundations. Responsible position. Prefer Great Lakes vicinity. PW-6329, Engineering News-Record.

Gen Supt or Supt—West Pointer—28 years experience, heavy construction, all phases. 9 dams—heavy foundations (including marine work)—missile bases—bridges—coffer dams—pile driving—mass concrete—mass rock & dirt excavation. Some buildings—capable administrator—good organizer. Have top following. PW-6307, Engineering News-Record.

Office Manager—Chief Acct. 20 yrs. hvy. const. field admin. costs, payrolls, purch., contracts. Specializing joint ventures. Relocate Avail. May 1. PW-6311, Engineering News-Record.

Const. Supt. B.S.C.E. 14 years heavy construction waterworks structures missile sites, 6 years Africa, 6 years So. America, Spain, multilinguist, go anywhere. PW-6318, Engineering News-Record.

Registered Civil Engineer, 38, married. Diversified experience in transportation facilities. Broad background in administration. Interested in responsible position with challenge and future. Will relocate. PW-6316, Engineering News-Record.

Civil Eng'r. Age 29, desires position as Assistant to town engineer. PW-6332, Engineering News-Record.

Detailing—Estimating—Sales. Strong background in structural steel industry. Desire responsible position with fabricator. PW-6330, Engineering News-Record.

Civil Engineer 32, M. ASCE, BSCE, PE, 7 years with present employer. Entire experience with consulting engineer includes structural, hydraulic and sanitary design, with extensive resident supervision of power plants, water and sewerage treatment plants and pipelines. Successful client relationships. Married. Desire permanent affiliation in southwest for family's health or Hawaiian Islands. Responsibility and opportunity for professional growth is a must. Complete resume upon your request. PW-6339, Engineering News-Record.

Reg. C. E. Construction desires construction manager or allied position with Gen. Contr. or owner. 20 yrs varied exp. PW-6337, Engineering News-Record.

SEARCHLIGHT SECTION

CLASSIFIED ADVERTISING

BUSINESS OPPORTUNITIES - EQUIPMENT - USED or RESALE

DISPLAYED RATES

The advertising rate is $25.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vert. on one col., 3 columns—30 in. to a page.

EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

UNDISPLAYED RATES

$2.70 a line, min. 3 lines. To figure advance payment count 5 average words as a line.

BOX NUMBERS count as one additional line in undisplayed ads.

DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads.

STRUCTURAL ENGINEERING
ARCHITECTURAL ENGINEERING
OUR COURSES of instruction by mail HAVE HELPED THOUSANDS to better positions and to pass State Board Examinations. Forty-eighth year.
Write today — without obligation
WILSON *Engineering Corp.*
College House Offices HARVARD SQ., CAMBRIDGE, MASS.

CONSTRUCTION SUPERVISION
Exclusive Training Course by mail for top positions. Publishers Manual of Advanced Construction Management. Send postcard for details.
National Schools of Construction
Est. 1932
Satsuma, Florida

FOR SALE or RENT
New MARION TRUCK CRANE
25 ton capacity, 60' boom, price below cost.
FURNIVAL Mchy. Co.
Phila. TRinity 7-5200

WANTED
MANITOWOC 3900 ERECTION CRANE
Prefer late Model and must be in excellent mechanical condition. Please give full information as to age, condition and how equipped.
ROBERT THOMPSON, P.O. Box 310
Memphis 1, Tenn.

FOR SALE
1—Erie Strayer Portable Truck Mixing Plant
2—Lorain MotoLoaders Cummings Model 153
1—6-7 Ton Lorain Truck Crane Model 107 with 40' boom & ⅜ yd. backhoe attachment.
1—20 Ton unit Truck Crane Model 2010 with 60' boom.
H. I. LEWIS CONSTRUCTION CO., INC.
P.O. BOX 232, MIDDLETOWN, PENNSYLVANIA
PHONE WHitney 4-4654

U. S. ARMY EE-8
Telephone fully reconditioned at 2 for $35.00. Any number can be used on same line. Wire 1¢ per ft. or $35.00 per mile. Write for complete telephone list.
TELEPHONE ENGINEERING CO.
Dept. ENR 3161 Simpson, Pa.

FOR SALE OR RENT

AMERICAN REVOLVER R-15 WHIRLEY GANTRY CRANES.
25 TON IND. BH. #5 DIESEL LOCO. CRANE.
40 TON IND. BH. #8 LOCO. CRANE. 1951.
40/50 TON AMERICAN #508 DIESEL LOCO. CRANE. NEW 1942.
50 TON AMERICAN STIFFLEG DERRICK AND 3 DRUM AMERICAN HOIST.
45 TON GEN. ELEC. DIESEL ELEC. LOCOS.
25 TON GEN. ELEC. DIESEL ELEC. LOCO.
1 YD. LORAIN L-50 CRANE. NEW 1951.

WHISLER EQUIPMENT CO.
1905 Railway Exchange Bldg., St. Louis 1, Mo.
CHestnut 1-4474

HEAVY EXCAVATION EQUIPMENT

LARGE DRAGLINES, SHOVELS, CRANES, ROTARY DRILLS, EUCLID DUMP TRUCKS

FRANK SWABB EQUIPMENT COMPANY, INC.
Hazleton National Bank Building, Hazleton Pa.
Phone GL 5-3658

LORAIN MOTO CRANE 30 TON MC 430

DEMONSTRATOR NEW 1960
PRICED ATTRACTIVELY

EDWARD EHRBAR, INC.
100 Secor Lane, Pelham Manor, N. Y.
Phone PElham 8-5100

SURVEYING INSTRUMENTS

USED • REBUILT • SALE
RENT • REPAIRING

TRANSITS AND LEVELS

New or Rebuilt
Sale or Rent

Headquarters for REPAIRS — any make — Factory Service We will also buy your old instruments or take them in trade.

A complete line of Engineering Instruments and equipment for field or office. Write for catalog NRL 203.

WARREN-KNIGHT CO.
Manufacturers of Transits and Levels
136 No. 12th St., Philadelphia 7, Penna.

RE-BUILT REPAIRS RENT EAL EXPERTS

ALL MAKES

BUFF

69 Dey St., New York WOrth 2-2797

TRANSITS & LEVELS
Various Makes
NEW & REBUILT

Fully equipped modern shops — all makes and models repaired — all work guaranteed — prompt service — complete line field supplies.

INSTRUMENTS RENTED

Midwest Distributors for W. & L. E. Gurley and Wild Heerbrugg Instruments

NATIONAL BLUE PRINT CO.
Established 1914.
210 S. Canal St. Chicago (6), Ill.

FOR SALE

10—15 cu. yd. Euclid Mod. 63TD End Dumps	$24,000.00 ea.
5—15 cu. yd. Euclid Mod. 46TD End Dumps	24,000.00 ea.
10—30 cu. yd. Athey Mod. PW20 Bottom Dump Trailers only	13,000.00 ea.
12—30 cu. yd. Mod. MX30 Southwest Bottom Dump Trailers	5,000.00 ea.
10—DW20 Cat Tractors w/30 cu. yd. Mod. PW20 Athey Bottom Dump Trailers	27,000.00 ea.
8—Mod. LRVX Mack Tractors w/30 cu. yd. Mod. 137W Euclid Bottom Dump Trailers	36,500.00 ea.
4—D9 Cat Tractors w/PCU's & Dozers, 18A Series	26,500.00 ea.
8—DB Cat Tractors w/PCU's & Dozers, 14A Series	16,500.00 ea.
2—Mod. 33LDT Euclid Pneu. Tired Scraper Units	27,000.00 ea.
10—DW20 Cat Scraper Units w/Modified Bowls	27,000.00 ea.
4—6' x 6' "Special" D.D. Sheepsfoot Tampers, U.S.B.R. Specs	7,500.00 ea.
1—6' x 16' Koehring Smooth Faced Sealing Roller, 50,000#	3,500.00
2—Mod. 12 Cat Motor Patrols, Cabs & Hyd. Shift Mole Boards	8,000.00 ea.
2—Mod. 200 Rex Double Pumpcretes, Electric	7,500.00 ea.
2—60" x 20' Link Belt H.D. Mang. Apron Feeders w/Drives	12,500.00 ea.
2—30" x 60" Single Roll Gruendler Crushers w/Drives	9,500.00 ea.
1—6' x 12' Tyler F800 Single Deck Screen w/Drive	6,000.00
Approx. 2 Miles 42" and 48" Channel Frame Conveyor System in Flights of 150' to 1885'	Price on Application

CALL, WIRE or WRITE for Complete Bulletin!

TRINITY DAM CONTRACTORS

10 West Orange Avenue — So. San Francisco, Calif.
Phone: PLaza 6-0300, Ext. 279

LOW COST INSTALLATION AND OPERATION

CABLEWAYS

IMMEDIATE SHIPMENT
ELECTRIC, STEAM OR DIESEL
CAPACITY 5 TO 20 TONS
SELL, RENT OR BUY

FOR DAMS, BRIDGES, BREAKWATERS, FILTRATION AND SEWERAGE PLANTS

FOR SPEED, ECONOMY, EFFICIENCY, FLOOD SAFETY, LABOR REDUCTION

AMBURSEN DAM CO. INC.
295 MADISON AVE. NEW YORK

High Speed in 6x6's
NEW ISSUE TRUCKS
GMC! MACK! REO "Eager Beaver!"
• *Tandem Axle* • *Front Wheel Drive*
For specifications, prices, delivery, write
MEMPHIS EQUIPMENT COMPANY
P.O. Box 2852, Dept. E., Memphis, Tenn.
NATION'S LARGEST ARMY TRUCK DEALER!

IMMEDIATELY AVAILABLE!

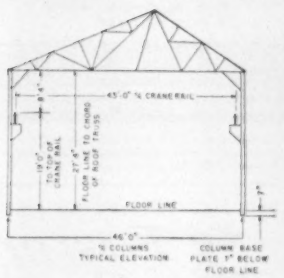
Modern Industrial Steel Buildings

FOR SALE . . . FOR RE-ERECTION!

Former Aluminum Co. of America Plant at Maspeth, N. Y. (New York City) Match Marked & Dismantled for Re-Erection
(Loaded F.O.B. New York City)

170,000 SQ. FT.

AVAILABLE IN *ANY LENGTH*—in 19 ft. multiples — One-story Mill Type — 46 ft. Clear Span center-to-center columns—19 ft. 7 in. to top of Crane Rail—27 ft. 11 in. in floor line to chord of roof truss—Equipped with crane runways. Re-erection diagrams furnished.



These Buildings Ideal for Machine Shop, Manufacturing Areas, Efficient Warehousing, Assembly Shop, etc.

(14) NORTHERN ENGINEERING
OVERHEAD TRAVELING CRANES
OPTIONALLY AVAILABLE • LATE-TYPE MAGNETIC CONTROL

For Additional Information Write—Wire—Call
Sales Agent

LIPSETT DIVISION
LURIA BROTHERS AND COMPANY, INC. • Attention: S. M. Lipsett
161 East 42nd St., New York 17, N. Y. • MUrray Hill 7-2700
Philadelphia Sales Offices — TRinity 8-8100 (Samuel Sons Iron & Steel Co. project)

PILING

SURPLUS NEW and USED — For Sale, Wanted or Rent

NEW, SURPLUS
STEEL SHEET PILING

BELVAL Z
perfect range of corrugated sections most economical section moduli

AMERLUX
STEEL PRODUCTS CO.
NEW YORK 17, N. Y.

Direct Mill Office of the
ARBED
STEEL MILLS
IN LUXEMBOURG

BELVAL P straight web section, load Supported bracketing

STEEL SHEET PILING by DIALING
Call St. Louis Collect
CHestnut 1-4474

RENT, SELL OR BUY · H-BEARING PILE · FAST SERVICE · NATION-WIDE STOCKS · LOW RATES · ALL LENGTHS · ALL SECTIONS

PILE DRIVING EQUIPMENT — NORTH, SOUTH, EAST or WEST

MISSISSIPPI VALLEY EQUIPMENT CO.
1908 Railway Exchange Bldg.
St. Louis 1, Mo. CHestnut 1-4474

PAVING EQUIPMENT

KOEHRING 34E PAVER
31,000 Batches, Used 3 Months
JOHNSON BULK CEMENT PLANT
BC-1 Single Silo S/N 60509
with Unloading Equipment
JOHNSON CHARGER TY 320
S/N 60332-1 (Nearly New)
TOURNAROCKER E-18
S/N TR 2806
REX SPREADER
Near New—Used 3 weeks
20'—25' S/N DA 135
KOEHRING 405 DRAGLINE CLAMSHELL
Used One Year
—Immediate Delivery on Any or All—
ARMSTRONG CO., INC.
P. O. Box 528 — Ames, Iowa

FOR SALE or RENT
13—LW "B" Tournapulls
3—LW "C" Tournapulls
2—LW Tournatractors
FURNIVAL Mchy. Co.
Phila. TRinity 7-5200

H-BEARING PILES
8" x 36# — 12" x 53#
10" x 42# — 14" x 73#
Immediate Shipment — Other Sizes Available
Chicago—Buffalo—Memphis—Cincinnati
Steel Sheet Piling—Pile Hammers
WHISLER STEEL PILING CO.
CHestnut 1-4474
1908 Railway Exchange Bldg., St. Louis 1, Mo.

PIPE
Surplus New & Used
FOR SALE, WANTED OR RENT

STEEL SHEET PILING
AVAILABLE FOR PROMPT SHIPMENT

Pcs.	Section	Length	Location
130	MP-101	40 to 45 ft.	Indiana
450	MP-116	20 to 60 ft.	Missouri
144	MP-116	24 to 31 ft.	Nebraska
139	MP-112	20 to 22 ft.	Illinois
310	MP-116	20 to 60 ft.	Tennessee
384	MP-115	15 to 60 ft.	Missouri
440	MP-115	15 to 60 ft.	Illinois

CONMACO, INC.
PHONE DRexel 1-3930
804 KANSAS AVE., KANSAS CITY, KANSAS

H & SHEET STEEL PILING
1400 PCS. BP8, BP10, BP12—BP14—55' to 60'
3700 PCS. BETH. SP6A, 50', 56' & 48' & 40' & 35'
1900 PCS. MP112—12', 25', 35', 40' & 60'
2800 PCS. BETH.—AP3 20', 25', 30', 35' & 60'
2500 PCS. BETH.—DP2—31', 35', 40', 50', 60'
1200 PCS. ZP38-ZP32—25', 36', 50', 65' & 77'
600 PCS. BETH. ZP27—25', 30', 50' & 60'
500 PCS. 10' & 15' Corrugated Piling
PILING BOUGHT—SOLD—RENTED
STOCKS: N. Y.—BOSTON—BUFFALO
TORONTO—BALTIMORE—JACKSONVILLE
MIAMI—RICHMOND—NEW ORLEANS
DIESEL LOCOMOTIVES & CRANES
12—Gen. Elec. 100, 80, 65, 45, 25, & 23 ton
25 Ton Industrial Loco Crane, 60' Boom
3600' JOY ELEC AIR COMPRESSOR
600 HP-2300 V-WN 224C-Radial New 58
R. C. STANHOPE, INC.
60 E. 42nd St. — N. Y. 17, N. Y.
Telephone MU-2-3075 or MU 9-1898

Call: HYACINTH 7-4900
PIPE, VALVES & FITTINGS
PILING • CULVERTS
ASBESTOS-CEMENT PIPE • ALUMINUM PIPE
ALBERT PIPE SUPPLY CO., Inc.
103 VARICK AVE., BROOKLYN 37, N.Y.

STEEL PIPE
NEW — STRUCTURAL — RECONDITIONED
VALVES & ALL TYPE FITTINGS
COMPLETE FABRICATION FACILITIES
GREENPOINT PIPE SUPPLY CORP.
341 Stagg Street, Brooklyn 6, N. Y. EV. 6-7200

STEEL SHEET PILING
LARSSEN and ROMBAS Sections
STOCKS AVAILABLE IN:
- Linden, New Jersey
- Ft. Lauderdale, Florida
- Houston, Texas

WESTERN SERVICES CORPORATION
601 E. Linden Ave., Linden, N. J.
MArket 4-4000 — HUnter 6-4000
In Florida Call: Port Everglades Steel Co. Ft. Lauderdale—JA. 4-6545
In Houston Call: G. Oliver—CA. 4-7234

BUY SELL RENT
USED STEEL
Beams—Pipe & Casing—Plate—BP's—RR Trestles—Bridges
LEOPOLD COHEN IRON CO.
3000 S. Kedzie Chicago 23, Ill. BI 7-6336

ASSOCIATED PIPE & FITTING CO., INC.
PILING PIPE SHELLS MANDREL FITTINGS · "H" BEARING PILE-POINTS AND SLEEVES · TIMBER SPLICERS AND SHOES · CULVERTS CIRCLE ARCH SECTIONAL
262 RUTHERFORD BLVD., CLIFTON, N.J. • PR 3-8400

RAILS-TIES
TRACK ACCESSORIES

Faster From Foster
STEEL-SHEET
PILING
All sections from our regular stocks
L. B. FOSTER CO.
Pittsburgh 30 · New York 7 · Chicago 4 · Houston 2
Los Angeles 5 · Atlanta 8 · Cleveland 35

When you need PILING . . . fast

use this section, as many contractors do, as a piling buying directory. It can save you time when you want to know, quickly, where to buy good new or used piling.

RAILS
MIDWEST STEEL CORP.
502 DRYDEN STREET
CHARLESTON, W.VA.

RAILROAD Cross and Switch TIES
Promptly from adequate stocks
NEW and USED (as available)
GILLIS & COMPANY
134 Breckenridge Lane — Louisville 7, Ky
TW 5-9484

PROFESSIONAL SERVICES

Cards arranged by areas, states, cities, names — **Additional cards on following pages**

NEW ENGLAND

Goodkind & O'Dea

Consulting Engineers

Design and Supervision
Foundations, Structures, Highways
1214 Dixwell Ave. Hamden, Conn.
610 Bloomfield Ave, Bloomfield, N. J.
325 Spring Street, New York, N. Y.
108 W. Lake Street, Chicago 1, Ill.

Fay, Spofford & Thorndike, Inc.

Engineers

Industrial Plants Incinerators
Water Supply, Sewerage, Drainage
Bridges Express Highways
Port and Terminal Work Airports

Designs Investigations
Supervision of Construction

Boston 8, Massachusetts

Jackson & Moreland, Inc.
Jackson & Moreland Int'l., Inc.

Engineers and Consultants

Electrical—Mechanical—Structural

Design and Supervision of Construction
—: for :—
Utility, Industrial and Atomic Projects

Surveys—Appraisals—Reports

Technical Publications
Boston Washington New York

Chas. T. Main, Inc.

Engineers

Design and Supervision of Construction for Industrial Plants—Electrical, Steam and Hydraulic Engineering—Investigations, Reports, and Appraisals.
Boston, Mass. Charlotte, N. C.

Metcalf & Eddy

Engineers

Soils, Foundations, Waterworks, Sewage Works, Drainage, Irrigation, Flood Control, Refuse, Industrial Wastes, Airports, Highways, Military Projects, Industrial and Commercial Facilities.
Statler Building, Boston 16, Massachusetts

Moore Survey & Mapping Corp.

Engineers-Photogrammetrists-Surveyors

Geodetic Control—Construction Layout
Aerial Topographic Surveys—Tax Maps
Hydrographic Surveys—Photogrammetry
29 Grafton Circle—Shrewsbury, Mass.

MIDDLE ATLANTIC

Airways Engineering Corp.

Airports, highways, dams, fuel storage, pipe lines, aerial topographic mapping.
1212-18th St., N.W.,
Washington 6, D. C.
Phone: REpublic 7-8131

Ewin Engineering Corporation

Designers of Port Facilities, Foundations, Industrial Plants, Bridges, Highways, Sewage Disposal and Urban Renewal.

5104 MacArthur Blvd. N.W.
Washington, D. C.

DuPont Plaza Center, Miami 32, Fla.
150 Savannah St. Mobile, Ala.

Benjamin E. Beavin Company

Drainage, Water, Sewerage, Grading, Soils & Geologic Engineering
Ports, Airfields, Highways, Structures
104 E. 25th St., Baltimore 18, Md.

Whitman, Requardt & Associates

Engineers—Consultants

Civil—Sanitary—Structural
Mechanical—Electrical
Reports Plans, Supervision, Appraisals
1304 St. Paul St., Baltimore 2, Md.

Baker-Wibberley & Associates, Inc.

Consulting Engineers

Civil, Sanitary, Structural, Foundations, Soils
49 N. Jonathan St., Hagerstown, Md.
Baltimore, Md. Waynesboro, Pa.

Louis Berger & Associates

Consulting Engineers
Studies—Design—Supervision
Highways—Structures—Airfields
177 Oakwood Avenue Orange, N. J.
2nd & Locust Streets Harrisburg, Pa.
200 S. Main St Salt Lake City, Utah
8 rue de Neuchatel Geneva, Switzerland
46 Baselerstrasse, Frankfurt, Germany

Joseph S. Ward and Associates

Consulting Soil and Foundation Engineers

Site Investigation, Boring Supervision, Laboratory Soil Testing, Foundation and Pavement Analysis and Design, Construction Supervision, Engineering Reports and Consultation
91 Roseland Avenue Caldwell, N. J.
Jefferson Building Phila., Penna

Albert C. Jones Associates

Consulting Engineers

Private and Municipal Engineering
Sewerage-Sewage Treatment
Water Supply and Distribution
Investigations and Appraisals
Photogrammetric Engineering
Aerial Maps
223 High St. Mount Holly, New Jersey

Edwards and Kelcey

Engineers and Consultants

Traffic Transportation Parking
Expressways Airports Public Works
Surveys - Reports Design - Supervision
3 William Street, Newark 2, New Jersey
Boston Salt Lake City New York
Providence Minneapolis

Porter & O'Brien

O. J. PORTER & COMPANY
CONSULTING ENGINEERS

Airports — Highways — Expressways — Buildings — Bridges — Dams — Harbors — Foundations — Stabilization — Pavements
Reports, Designs & Supervision
415 Frelinghuysen Ave., Newark 5, N.J.
4201 Sunset Blvd. Los Angeles 29, Cal.
1421-47th Avenue Sacramento 22, Cal.

Boswell Engineering Co.

Consulting Engineers

Highways, Bridges, Airports, Municipal
Ridgefield Park, N. J.
West Nyack, New York
Salt Lake City, Utah
Anchorage, Alaska

M. C. Tomasetti

Consulting Engineers—Surveyors

Designs, Construction Supervision
Highways—Airfields—Structures
Soils—Foundations—Pavements—Drainage
Materials Investigations
Site Designs, Subdivisions, Surveys
Greenwich, Conn., New Rochelle, N. Y.

B. K. Hough

Consulting Engineer
Soils & Foundation Engineering

Site investigations, soil testing, design analysis for earthworks, foundations and pavements, field inspection, engineering reports, consultation.
121 E. Seneca St. Ithaca, New York

Ammann & Whitney

Consulting Engineers

Design and Supervision of Construction of Bridges, Highways, Expressway, Buildings, Special Structures, Airports and Airport Facilities

111 Eighth Avenue, New York 11, N.Y.

Milwaukee - Washington - Philadelphia
Paris - Athens - Tehran

Blauvelt Engineering Co.

CONSULTING ENGINEERS

Highways,
Bridges,
Reports

New York, N. Y. Philadelphia, Pa.
Woodbury, N. J. Crystal Lake, Ill.

Clinton Bogert Engineers

Consultants

Clinton L. Bogert Ivan L. Bogert
Donald M. Ditmars Robert A. Lincoln
Charles A. Manganaro William Martin
Water & Sewage Works Incinerators
Drainage Flood Control
Highways and Bridges Airfields
145 E. 32nd St., New York 16, N. Y.

Bowe, Albertson & Associates

Engineers

Water and Sewage Works—Industrial Wastes—Refuse Disposal—Valuations—Laboratory Service
75 West St. 1000 Farmington Ave.
New York 6, N.Y. W. Hartford 7, Conn.

John V. Dinan

Consulting Engineers

Established 1925

Pre & Post Construction Structural (Building) Examinations, Engineering investigations, Reports, Expert Testimony, Seismograph Studies of Blasting and Pile Driving Vibration, Design, Supervision of Shoring, Underpinning, Foundations.

303 W. 42nd St., New York 36, N. Y.
COlumbus 5-6773

Buck, Seifert and Jost

Consulting Engineers

Water Supply — Sewerage — Hydraulic Developments—Reports and Valuations, Chemical and Biological Laboratories.
New York City, 112 E. 19th St.

Ebasco Services Incorporated

ENGINEERS
CONSTRUCTORS
MANAGEMENT CONSULTANTS
Design and Construction
Financial and Operating Consultation
Investigations and Reports
Consulting Engineering
Appraisals
Two Rector Street, New York 6, N. Y.
140 S. Clark Street, Chicago 3, Ill.
1416 Commerce Bldg., Dallas 1, Texas
611 Equitable Bldg., Portland 4, Ore.
120 Montgomery Street,
San Francisco 4, Cal.
1625 Eye Street, N.W. Wash. 6, D. C.

ALWAYS READY

Yes, these consultants are always ready to help you with any problem concerning engineered construction. Call on them with the assurance that you will be receiving the finest of professional advice.

Gibbs & Hill, Inc.

Consulting Engineers
Water, Sewage & Industrial Waste Treatment Works — Roads, Bridges & Railroads—Conventional & Nuclear Power Generation — Electric Transmission & Distribution Systems—Industrial & Communication Facilities.
PENN STATION NEW YORK 1, N.Y.

Hardesty & Hanover

Consulting Engineers

Bridges
Fixed and Movable
Highways
Expressways, Thruways
Special Structures
Design, Supervision,
Inspection, Valuation

101 Park Avenue New York 17

Frederic R. Harris, Inc.

Consulting Engineers
New York, N. Y.

Norwalk, Conn. New Orleans, La.
Toronto, Canada The Hague, Holland

Hazen and Sawyer

Engineers

Richard Hazen Alfred W. Sawyer
H. E. Hudson, Jr.
Water and Sewage Works
Industrial Waste Disposal
Drainage and Flood Control
360 Lexington Ave., New York 17, N.Y.

Howard, Needles, Tammen & Bergendoff

Consulting Engineers
Bridges • Structures • Foundations
Admin. Ser. • Traffic & Parking •
Express Highways • Airports
Kansas City - Cleveland - New York

King & Gavaris

CONSULTING ENGINEERS

Associates:
W. Mack Angas
David Carsen
Dr. G. P. Tschebotarioff
Sidney Zecher

Bridges, Highways, Tunnels
Waterfront Structures, Reports
Investigations, Foundations
Design & Supervision of Construction
41 E. 42nd St., New York 17, N. Y.

Litchfield Whiting Bowne & Assoc.

Engineers—Architects

Sewage, Water, Bridges, Airports, Flood Control, Electrification, Hospitals, Schools, City Planning, Abbatoirs, Highways, Air Conditioning, Industrial Buildings, Military.
8 West 40th St., N. Y. 18, N. Y.
Rome Tehran Bangkok

Modern Engineering Corporation

Design—Consulting

62 William Street, New York, N. Y.

Moran, Proctor Mueser & Rutledge

Consulting Engineers

Foundations for Buildings, Bridges and Dams; Tunnels, Bulkheads, Marine Structures; Soil Studies and Tests; Reports, design and supervision.

415 Madison Ave., New York 17, N.Y.
Eldorado 5-4800

E. Lionel Pavlo

Consulting Engineer

Design, Supervision, Reports
Bridges, Highways, Expressways
Marine Structures, Public Works
Industrial Construction, Airports
642 Fifth Ave. New York 19, N. Y.

When you need a SPECIALIST in a hurry . . .

Engineering News-Record's Professional Service Section offers the quickest, most direct method of contacting consultants who may be available NOW.

PROFESSIONAL SERVICES

Cards arranged by areas, states, cities, names

Additional cards on preceding and following pages

Parsons, Brinckerhoff, Quade & Douglas

ENGINEERS

Bridges, Highways, Tunnels, Airports, Subways, Harbor Works, Dams, Canals, Traffic Parking and Transportation Reports, Power, Industrial Buildings, Housing, Sewerage and Water Supply.

165 Broadway New York 6, N. Y.

Malcolm Pirnie Engineers

Malcolm Pirnie Carl A. Arenander
Ernest W. Whitlock Malcolm Pirnie, Jr.
Robert D. Mitchell Alfred C. Leonard

MUNICIPAL AND INDUSTRIAL

Water Supply—Water Treatment - Sewerage and Waste Treatment
Drainage—Rates—Refuse Disposal

25 West 43rd St., New York 36, N. Y.
2910 Grand Central Ave., Tampa 9, Fla.

The Pitometer Associates

Engineers

Water Waste Surveys
Trunk Main Surveys
Water Distribution Studies
Water Measurements & Special Hydraulic Investigations
New York, 50 Church St.

Alexander Potter Associates

Consulting Engineers

Water Works, Sewerage, Industrial Waste, Hydraulic Works, Reports, Designs, Appraisals.

50 Church St., New York, N. Y.

Praeger-Kavanagh

Engineers

126 East 38th St., New York 16, N. Y.

Seelye Stevenson Value & Knecht

Consulting Engineers

Richard E. Dougherty, Consultant

Airports, Highways, Bridges, Dams, Water Supply, Sanitation, Railroads, Piers, Industrial Plants, Reinforced Concrete, Steel, Industrial Waste Disposal, Foundations, Soil Studies, Real Estate Development.

Civil — Mechanical — Electrical

101 Park Avenue New York 17, N. Y.

YOU TOO

can use the services of the consulting firms listed on this page. They represent a great and varied collection of specialized talents.

USE THEM TO

Supply talents and specialties not existing in your organization
Obtain authoritative outside checks on your own findings and conclusions
Provide neutral and impartial opinion when there might be a difference of opinion in your company
Take full advantage of the progress and mistakes made by others
Ease the present—and continuing—shortage of engineers
Secure special services that would not warrant full time employment
Do a hundred and one different jobs for you

Severud-Elstad-Krueger-Associates

Consulting Engineers

Structural Design - Supervision
Reports - Buildings - Airports
Special Structures

415 Lexington Ave., New York 17, N.Y.

Singstad & Baillie

Consulting Engineers

Ole Singstad David G. Baillie, Jr.
Tunnels, Subways, Highways
Foundations, Parking Garages

24 State St. New York 4, N. Y.

Frederick Snare Corporation

Engineers—Contractors

Harbor Works, Bridges, Power Plants, Dams, Docks and Terminals.

Difficult and Unusual Foundations A Specialty

233 Broadway, New York City 7

Havana, Cuba Lima, Peru
Bogota, Columbia, Caracas, Venezuela

Steinman, Boynton, Gronquist & London

Consulting Engineers

HIGHWAYS - BRIDGES
STRUCTURES

117 Liberty St., New York 6, N. Y.

Tippetts-Abbett-McCarthy-Stratton

Engineers and Architects

Ports, Harbors, Flood Control, Power Dams, Bridges, Tunnels, Highways, Railroads, Subways, Airports, Traffic, Foundations Water Supply, Sewerage, Reports, Design, Supervision, Consultation.

375 Park Avenue, New York 22, N. Y.

Arnold H. Vollmer Associates

Consulting Engineers

Highways, Parks, Bridges, Municipal Improvements, Public Works, Reports, Surveys, Contract Plans.
25 W. 45th Street, New York 36, N. Y.
Telephone: CIrcle 7-6250

Lawrence S. Waterbury

Consulting Engineer

Bowling Green 9-9298
26 Broadway, New York 4

Keis & Holroyd

Consulting Engineers

Formerly Solomon & Keis
Since 1906
Water Supply, Sewage Disposal, Garbage & Refuse Incineration, Industrial buildings.
Troy, N. Y.

Royal Contracting Corp.

MUD-JACKING, DRILLING & GROUTING SPECIALISTS

Box 141, Bridgeport, Pa.
Ph. BRoadway-2-5891

Gannett Fleming Corddry & Carpenter, Inc.

ENGINEERS

Dams, Water Works, Sewage, Industrial Wastes & Garbage Disposal, Highways, Bridges & Airports Traffic & Parking — Appraisals, Investigation & Reports.

Harrisburg, Penna.

Branch Offices
Pittsburgh, Pa. Philadelphia, Pa.
Daytona Beach, Fla.

Capitol Engineering Corporation

Consulting Civil Engineers

Dillsburg, Pennsylvania, U.S.A.

Modjeski and Masters

Consulting Engineers

Bridges and other Structures
Foundations
Highways and Expressways

900 North Sixth St. Harrisburgh, Pa.
Philadelphia - Miami - New Orleans

Albright & Friel Inc.

Consulting Engineers

Water, Sewage, Industrial Wastes and Incineration Problems, City Planning, Highways, Bridges and Airports, Dams, Flood Control, Industrial Buildings, Investigations, Reports, Appraisals and Rates

3 Penn Center Plaza Phila. 2, Pa.

Fridy, Gauker, Truscott & Fridy, Inc.

Architects & Engineers

Water, Sewer, Waste Disposal, Roads, Airports, Power & Lighting, Petroleum Facilities, Hospitals, Schools, Public & Industrial Buildings, Reports, Plans, Supervision, Appraisals.

1321 Arch St. Philadelphia 7, Pa.

Harris-Dechant Associates

Consulting Engineers

Water Supply, Dams, Stream Improvement, Flood Control, Port & Harbor Development; Sanitary & Industrial Wastes; Hydro & Steam Power; Highway Engineering & Design.
Surveys—Reports—Economics

123 S. Broad St., Philadelphia 9, Pa.

Justin & Courtney

Consulting Engineers

Joel B. Justin - Neville C. Courtney
Dams and Power Problems, Hydroelectric, River Basin Development, Water Supply, Foundations.

121 South Broad Street
Philadelphia 7, Pa.

Yule, Sticklen, Jordan & McNee

ENGINEERS

Bridges, Highways, Airports
Design, Investigations, Reports
Supervision of Construction
Civil, Structural Mechanical & Electrical

Cedar Cliff Drive
Camp Hill, Pa.

1225 Vine Street
Philadelphia 7, Pa.

5564 North High Street
Columbus, Oh

Hunting, Larsen & Dunnells,

Engineers

Industrial Plants — Warehouses, Office and Commercial Buildings, Steel and Reinforced Concrete. Design and Supervision, Reports.

1150 Century Bldg., Pittsburgh, Pa.

Morris Knowles Inc.

Engineers

Water Supply and Purification Sewerage and Sewage Disposal, Valuations, Laboratory, City Planning.

Pittsburgh, Pa.

Peter F. Loftus Corporation

Design and Consulting Engineers

Electrical • Mechanical • Structural
Civil • Nuclear • Architectural

First National Building
Pittsburgh 22, Pennsylvania

Pennsylvania Drilling Company

Subsurface Explorations, Grouting, Industrial Water Supply, Mineral Prospecting.
Large Diameter Drilled Shafts, Reports

1205 Chartiers Ave. Pittsburgh 20, Pa.

Michael Baker, Jr., Inc.

Consulting Engineers, Civil Engineers, Planners & Surveyors; Airports & Highway Design; Water Works & Sewerage Design & Operation; Aerial Topo Maps; Surveys; Reports & Investigations; Irrigation, Home Off.—Rochester, Pa. Br. Off.: Jackson Miss.; Harrisburg, Pa.; College Park, Md.

Sprague & Henwood, Inc.

Drilling Services

Foundation Investigations, Soil Testing & Test Borings, Grout Hole Drilling & Pressure Grouting, Diamond Core Drilling

Main Office

221 W Olive Street, Scranton, Pa.

Branches:

1009 Western Savings Fund Bldg., Philadelphia, Pa.
11 W. 42nd St., New York, New York
300 Mt. Lebanon Blvd., Suite 100 Pittsburgh 34, Pa.
Box 1446—Grand Junction, Colorado
Nashville, Tennessee
Tucson, Arizona
Buchans, Newfoundland

Frank D. McEnteer's Associates, Inc.

Consulting Engineers

Bridges, Highways, Industrial Plants
Design, Investigations, Surveys

Terminal Building, Clarksburg, W. Va.

SOUTH

Harry Hendon & Associates, Inc.

Engineers

Civil Engineers—Public Utilities
Investigation—Designs
Supervision of Construction

P. O. Box 740A 925 Sligh Blvd.
Birmingham 13, Ala. Orlando, Florida

Palmer and Baker Engineers, Inc.

Consulting Engineers - Architects

Surveys-Reports-Design-Supervision
Consultation

Transportation and Traffic Problems
Tunnels-Bridges-Highways-Airports
Industrial Buildings
Waterfront and Harbor Structures
Graving and Floating Dry Docks
Complete Soils, Materials and Chemical Laboratories

Mobile, Ala New Orleans, La.
Washington, D. C.

THIS SECTION

is available to consulting engineers to contact prospective clients every week or every other week.

CONSULT THESE SPECIALISTS...

When you need professional assistance in solving difficult problems. Their specialized knowledge and broad experience can prove invaluable in saving both time and money for you.

Engineering News-Record invites other consultants to list the special services they offer on these pages.

Rates for the Professional Services section are:

PER WEEK	13 times	26 times	52 times
¾"—$14.35	$13.35	$12.45
1½"—$23.85	$22.30	$21.00

Minimum order 13 insertions.

PROFESSIONAL SERVICES

Cards arranged by areas, states, cities, names — **Additional cards on preceding and following pages**

Rader and Associates
Engineers - Architects
Sewage Disposal, Water Works, Ports, Airports, Bridges, Highways, Office and Commercial Buildings, Industrial Plants. Reports, Investigations, Consultations, Aerial Photography, Photogrammetry.
First Natl. Bank Bldg., Miami 32, Fla.

J. Stephen Watkins
Consulting Engineers
Highways—Bridges—Sewerage
Water Supply—Industrial Plants
446 E. High St., Lexington, Kentucky
2617 Dixie Highway, Louisville, Ky.
107 Hale St., Charleston, W. Va.

Eustis Engineering Company
FOUNDATION AND SOIL
MECHANICS INVESTIGATIONS
Soil Borings — *Laboratory Test*
Foundation Analyses — *Reports*
3635 Airline Highway
Metairie, Louisiana

Schmidt Engineering Co. Inc.
Consulting Engineers
Investigations, Reports, Designs, Heavy Construction — Dams — Hydroelectric Projects—Foundation Explorations and Treatment—Water and Sewerage Works
Emerson Building Chattanooga, Tenn.
Greater Tenn. Bldg. Knoxville, Tenn.

ETCO Engineers and Associates
Foundation Consultants
Test Borings Laboratory Tests
Recommendations, Design and Supervision
2116 Canada Dry St., Houston 23, Tex.
727 Main St. Baton Rouge, La.
427 Carondelet St., New Orleans 12, La.

Mott Core Drilling Co.
Contractors—Manufacturers
Core Borings for Buildings, Bridges, Foundation Soil Tests, Highways, Pressure Grouting, Dams, Mine Shafts
Mineral Prospecting
Mott Bldg. 830 Eighth Ave.
Huntington, 17, W. Va.

MIDDLE WEST

Alvord, Burdick & Howson
CONSULTING ENGINEERS
Water Works — Sewerage
Water Purification — Sewage Treatment
Floor Relief — Power Generation
Drainage — Appraisals
20 North Wacker Drive, Chicago

Dames & Moore
Consultants in
Applied Earth Sciences
Soil Mechanics — Engineering Geology — Geophysics
Atlanta, Chicago, Honolulu, Houston, Los Angeles, New York, Portland, Salt Lake City, San Francisco, Seattle.

THE CONSULTING ENGINEER
By reason of special training, wide experience and tested ability, coupled with professional integrity, the consulting engineer brings to his client detached engineering and economic advice that rises above local limitations and encompasses the availability of all modern developments in the fields where he practices as an expert.

Consoer, Townsend & Associates
Consulting Engineers
Sewage treatment, sewers, storm drainage, flood control—Water supply and treatment—Highway and bridges—Airports—Urban renewal—Electric and gas transmission lines—Rate studies, surveys and valuations—Industrial and institutional buildings.
360 East Grand Ave. Chicago 11, Ill.

De Leuw, Cather & Company
CONSULTING ENGINEERS
Public Transit — Subways
Traffic & Parking — Railroad Facilities
Expressways — Industrial Plants
Grade Separations — Municipal Works
Urban Renewal — Port Development
150 North Wacker Drive, Chicago 6
San Francisco New York Boston

Harza Engineering Co.
Consulting Engineers
Hydroelectric Plants & Dams
Transmission Lines
Flood Control, Irrigation
River Basin Development
400 West Madison Street Chicago 6

Greeley and Hansen
Engineers
Water Supply, Water Purification
Sewerage, Sewage Treatment
Flood Control, Drainage, Refuse Disposal
14 E. Jackson Boulevard
Chicago 4, Illinois

Hazelet & Erdal
CONSULTING ENGINEERS
Fixed & Movable Bridges, Expressways, Industrial Plants, Airports, Dams.
Monadnock Block, Chicago 4, Ill.
Dixie Terminal Bldg., Cincinnati 2, O.
Commerce Bldg., Louisville 2, Ky.
Oding Bldg., Lansing 33, Mich.

Pioneer Service & Engineering Co.
Consulting and Design Engineers
Operations—Purchasing
Construction Management
Public Utilities—Industrials
231 So. La Salle St. Chicago 4

Sargent & Lundy
ENGINEERS
Consultants to the Power Industry
Studies • Design • Supervision
140 South Dearborn Street,
Chicago 3, Ill.

Soil Testing Services, Inc.
Consulting Soil and Foundation Engineers
John P. Gnaedinger Clyde N. Baker, Jr.
Site Investigations, Foundation Recommendations and Design, Laboratory Testing, Field Inspection & Control
1827 N. Harlem Ave., Chicago 35, Ill.

Suhr, Peterson, Peterson & Suhr
Consulting Engineers
REPORTS—PLANS—SUPERVISION
Sewerage, Water Supply, Flood Control & Drainage, Airports, Roads, Surveys
Fixed & Movable Bridges
130 N. Wells St., Chicago 6, Ill.
P. O. Box 1858, Anchorage, Alaska

Chas. W. Cole & Son
Engineers and Architects
3600 E. Jefferson Blvd.
South Bend, Indiana
2112 W. Jefferson St.
Joliet, Illinois

The Hinchman Corporation
Consulting Engineers
"WORLD-WIDE ACTIVITIES"
Survey • Design • Supervision
Specializing In
Corrosion Control•F.C.C. Certification Tests
Electromagnetic Interference Studies
Francis Palms Bldg., Detroit, Michigan

Hudson Worthington Associates Limited
Civil Structural Municipal
Industrial, Commercial, Structures, Highway, Bridge, Sewage, Industrial waste, Analysis, Research, Estimates, Reports.
214 N. Main St., Hudson, Ohio
OL 3-6787

The H. C. Nutting Company
Testing Engineers—Inspection Service
Foundation Investigation—Test Borings
Soil Mechanics—Sewage Flows
Construction Control—Concrete
Water Waste Survey
4120 Airport Road Cincinnati 26, O.

The Austin Company
Design and Construction
Manufacturing and Process Plants
Newspaper and Broadcasting Bldgs.
Power Plants—Industrial
Industrial Office Buildings and Laboratories
Merchandising Bldgs. & Facilities
Plant Location Surveys
New York CLEVELAND Houston
Chicago Montreal Los Angeles
Detroit Seattle

Havens and Emerson
A. A. Burger, H. H. Moseley, J. W. Avery, F. S. Palocsay, E. S. Ordway, A. M. Mock, G. H. Abplanalp, S. H. Sutton
Frank C. Tolles, Consultant
Water, Sewerage, Garbage, Industrial Wastes, Valuation—Laboratories
Leader Bldg. Woolworth Bldg.
Cleveland 14 New York 7

The Osborn Engineering Co.
DESIGNING-CONSULTING
Industrial Plants — Office Buildings
Stadiums Grand Stands Field Houses
Bridges — Garages — Laboratories
7016 Euclid Ave. Cleveland 3, Ohio

Rackoff Associates
Engineers
Highways, Expressways, Bridges, Sewerage and Water Systems, Fiscal and Master Planning, Investigations, Urban Renewal, Supervision
1033 W. Third Ave., Columbus, Ohio

Toledo Testing Laboratory
Engineers—Chemists
Concrete—Soils—Asphalt
Inspection — Research
Tests — Development
Foundation Investigation
Borings—Diamond Drilling
Load Tests
Soils Mechanics Laboratory
1810 North 12th St. Toledo 2, Ohio

Jones, Henry & Williams
Consulting Sanitary Engineers
Water works Sewerage & Treatment
Waste Disposal
2000 W. Central Ave., Toledo 6, Ohio

WEST OF MISSISSIPPI

Heron Engineering Co.
Consulting Engineers
For all types of Aerial Tramways, Cableways, and Suspended Structures
2000 South Acoma St.
Denver 23, Colorado

Stanley Engineering Company
Consulting Engineers
Hershey Building 208 S. LaSalle St.
Muscatine, Ia. Chicago 4, Ill.

Black & Veatch
Consulting Engineers
Water - Electricity - Sewage - Gas - Industry - Reports, Design, Supervision of Construction, Investigations, Valuation and Rates.
1500 Meadow Lake Parkway
Kansas City 14, Missouri

Bucher & Willis
Consulting Engineers & Planners
Planning—Bridges and Structures—Roads, Streets, Highways and Airports—Municipal Services—Aerial Photogrammetry—Surveys—Foundations—Reports
1412 W. 47th St. Box 583
625 E. Crawford
Kansas City 5, Missouri Salina, Kan.

Burns & McDonnell
Engineers—Architects—Consultants
4600 E. 63rd St. Trafficway
Kansas City 41, Missouri

Russel and Axon
Consulting Engineers
Civil — Sanitary — Structural
Industrial — Electrical
Rate Investigations
408 Olive St. St. Louis 2, Mo.
Municipal Airport, Daytona Beach, Fla.

Sverdrup & Parcel Engineering Co.
Engineers—Architects
Bridges, Structures and Reports, Industrial and Power Plant Engineering
915 Olive St., St. Louis 1, Mo.
417 Montgomery St., San Francisco Calif.

Benham Engineering Company
Established in 1909
Design and Consulting Engineers
215 N E 23rd Street
Oklahoma City 5, Oklahoma

Spencer J. Buchanan and Associates, Inc.
Consulting Engineers
Soil Mechanics and Foundation Engineering. Civil Engineering Services Reports, Design and Field Supervision.
310 Varisco Building, Bryan, Texas
TAylor 2-3767

THIS SECTION
Is available to consulting engineers to contact prospective clients every week or every other week.

QUICK solutions to your technical problems are available through these consultants. Think first of the Professional Services Section of your publication when considering calling in an expert.

PROFESSIONAL SERVICES

Cards arranged by areas, states, cities, names — **Additional cards on preceding pages**

Soil Mechanics Incorporated
Foundation Exploration and Testing Services
Site Investigations, Soil Borings, Field and Lab Testing, Load Tests, Reports
310 Varisco Building, Bryan, Texas
TAylor 2-3767

Lockwood, Andrews & Newnan
Consulting Engineers
Navigation Facilities — Public Works Airports — Earthworks — Roads Structural, Mechanical — Electrical Reports — Design — Supervision Surveys — Valuations
Corpus Christi—Houston—Victoria, Texas.

FAR WEST

International Engineering Company, Inc.
ENGINEERS
Investigation - Reports - Design Procurement - Field Engineering Domestic and Foreign
74 New Montgomery St.
San Francisco 5, California

Jacobs Associates
Consulting Construction Engineers
TUNNELS—DAMS
EARTHMOVING—FOUNDATIONS
Methods, Cost Estimates, Plant Design, Management, Surveys, Engineering Geology, Materials Handling
503 Market St., San Francisco 5, Calif.

Nevada Testing Laboratories, Ltd.
Engineering—Civil—Soils & Foundation Consultants—Field Testing—Soil Borings — Rock Drilling — Materials Field Control—Load Tests—Laboratory Testing—Soils—Concrete—Asphalt
300 W. Boston Ave. Las Vegas, Nev.

INSPECTION & TEST

Robert W. Hunt Company
Inspection and Testing of Engineering Materials & Equipment
General Offices and Laboratories
810 South Clinton Street, Chicago 7.
All Principal Cities

Johnson Soils Engineering Laboratory
Foundation Design - Highway & Airport Pavements - Construction Control - Load Tests Shear & Consolidation Tests - MOBILE LABORATORIES
193 West Shore Ave., Bogata, N. J.
Bogata-Hubbard 7-4408

Pittsburgh Testing Laboratory
A national service with complete laboratory and inspection facilities. Laboratories in principal cities.
Main Office: 1339 Locust St., Pittsburgh, Pa.

AERIAL SURVEYS

American Air Surveys, Inc.
AERIAL TOPOGRAPHIC MAPS & AERIAL PHOTOS FOR
• Highways • Airports • Power & Pipe Lines • Railroads • Mining • All types construction • Stockpile Inventories
947 Penn Ave. Pittsburgh 22, Pa.
Branches-Manhasset, N.Y.-Atlanta, Ga.

Aerial Map Service Co.
Topographic, Planimetric, Photo Maps for Highways, Mining, Resources, Construction, City Maps, Tax Maps, Photo Geology, Tellurometer Radio Distance Measurements, Triangulation, Electronic Computation.
1016 Madison Ave., Pittsburgh 12, Pa.

GEOLOGISTS

Geologic Associates
ENGINEERING GEOLOGISTS
Studies and Reports
Foundation Investigations
Specialized Drilling and Sampling
Brentwood, Tennessee
Phone (Nashville) VErnon 2-1748

CONSULTANTS!
This section provides you with a dignified, ethical means of presenting your specialized services to key men in engineering.

HOW ABOUT YOU? These consultants are taking full advantage of the opportunity now available to reach over 82,000 prospects and customers every week. You, too, can now receive the benefits of the PROFESSIONAL SERVICES SECTION 52 times in a year.

For further information write:
ENGINEERING NEWS-RECORD
Class. Adv. P.O. Box 12, New York 36

OFFICIAL PROPOSALS

(CONTINUED FROM PAGE 82)

Bids: April 6, 1961

Power Authority of the State of New York

ADVERTISEMENT FOR PROPOSALS
FOR
CONSTRUCTION OF ADMINISTRATION BUILDING
FOR NIAGARA POWER PROJECT
IN LEWISTON, NIAGARA COUNTY, NEW YORK
SPECIFICATION NO. PA-N-23041
NIAGARA CONTRACT NO. N 32

NOTICE TO CONTRACTORS: The Power Authority of the State of New York will receive sealed proposals for Construction of the Administration Building for the Niagara Power Project, in Lewiston, Niagara County, New York, until 10:30 A.M. Eastern Standard Time on the 6th day of April, 1961, at the Authority's Office, 18th Floor, The Coliseum Tower, 10 Columbus Circle, New York 19, New York, at which time and place the proposals will be publicly opened and read aloud.

The work under this contract consists of the construction of a building approximately 50 feet by 175 feet. The building will have a basement and first floor with a structural steel frame and glass and structural clay tile walls. Outside work consists of construction of drives, sidewalks, parking areas, building and area drains, sanitary system, curbs, lighting pole foundations with complete underground wiring, underground ducts and vents and area grading.

All work shall be completed on or before May 15, 1962.

Plans, specifications and proposal forms for the work may be obtained from the Power Authority of the State of New York, 18th Floor, The Coliseum Tower, 10 Columbus Circle, New York 19, New York, upon application and prepayment of a fee of Ten Dollars ($10.00) per initial set of contract documents, and Five Dollars ($5.00) per set for additional sets, no part of which will be refunded. Plans, specifications and proposal forms for the work will be on file in the Authority's Office and in the offices of the Engineer, Uhl, Hall & Rich, 230 Congress Street, Boston 10, Massachusetts, and may be inspected by prospective bidders during office hours.

Bid must be made and returned in duplicate in accordance with instructions contained in the Information for Bidders. Guarantee will be required with each bid in an amount not less than 20 percent of the total of the gross sum bid.

The right is reserved to reject any or all bids.

W. S. CHAPIN
GENERAL MANAGER

Bids: June 1961

Kingdom of Thailand Royal Irrigation Department Bangkok, Thailand

INVITATION FOR BIDS—NO. YS-3-5

The Royal Irrigation Department of the Kingdom of Thailand hereby invites sealed, written bids for furnishing and delivering the following goods, equipment, and materials either fob Contractor's shipping point or cif Bangkok Wharf, Thailand, for the Yanhee Multipurpose Project, Kingdom of Thailand, in accordance with the Contract Documents:

Schedule No. 1: Fifteen (15) 230 kv, 10,000 mva outdoor air blast circuit breakers.

Schedule No. 2: Sixteen (16) 69 kv, 3,500 and 1,500 mva outdoor power circuit breakers.

Five (5) 14.4 kv, 1,500 and 1,000 mva outdoor power circuit breakers.

Schedule No. 3: Fifty-two (52) 230 kv, manually-gang-operated, 3-pole, vertical break, outdoor disconnecting and selector switches.

Seventy (70) 69 kv manually-gang-operated, 3-pole, vertical break, outdoor disconnecting switches.

Twelve (12) 14.4 manually-gang-operated, 3-pole, vertical break, outdoor disconnecting switches.

Thirty-three (33) 14.4 kv, hook operated, single-pole, power fuse disconnecting switches.

Invitations for Bids will be issued in March, 1961, and will be opened in June, 1961. Copies of Contract Documents, Invitation for Bids No. YS-3-5, Power Circuit Breakers, Air Switches and Disconnecting Fuses, may be obtained by qualified Bidders on written request to:

Royal Irrigation Department
Attention: Thai Liaison Engineer
c/o Engineering Consultants, Inc.
1901 South Navajo Street
Denver 23, Colorado, U. S. A.

Each request must be accompanied by a check or money order, payable to the Royal Irrigation Department, in the amount of U. S. $20.00 for each copy of the Contract Documents requested. The remittance is nonreturnable.

M. L. Xujati Kambhu
Director General
Royal Irrigation Department
Kingdom of Thailand
Bangkok, Thailand

Bids: April 10, 1961

Construction of Sewers and Sewage Treatment Plant

Sealed bids for the construction of Sewers and Sewage Treatment Plant will be received by the Board of Trustees of the Village of LeRoy at the Village Hall, 3 West Main Street, LeRoy, New York, until 2 o'clock, P.M., E.S.T. on the 10th day of April, 1961.

Bidding forms can be obtained and plans and specifications examined at the office of the Village Clerk at the Village Hall, or the office of the Wm. S. Lozier Company, Engineers, 10 Gibbs Street, Rochester, New York.

Copies of plans and specifications for Contracts A, B, C, D, E, and F may be obtained upon the payment of twenty dollars ($20.00) for Contracts A and B, and twenty dollars ($20.00) for Contracts C, D, E, and F which will not be refunded.

The work consists of the construction of:

Contract "A"—Approximately 68,000 feet of 8" thru 15" street and trunk sewers and appurtenances,
Contract "B"—Approximately 10,000 feet of 10" thru 24" intercepting sewer and appurtenances
Contract "C"—Sewage Treatment Plant—General
Contract "D"—Sewage Treatment Plant—Plumbing
Contract "E"—Sewage Treatment Plant—Heating and Ventilating
Contract "F"—Sewage Treatment Plant—Electrical

Edward T. Atherton,
VILLAGE CLERK

ADVERTISERS IN THIS ISSUE

Aetna Casualty & Surety Co. 7
Wm. Ainsworth & Sons, Inc. 60
Allison Div., General Motors Corp. 61
Alpha Portland Cement Company 73
American Pipe and Construction Co. 3rd Cov.
American Sisalkraft Co. 53
American Steel & Wire Div., United States Steel Corp. 34-35

Bethlehem Steel Co. 50-51

Charles Bruning Co., Inc. 63
A. M. Byers Company 59
Chicago Bridge & Iron Company ..... 2nd Cov.
Concrete Reinforcing Steel Institute 16

Richard Dudgeon Inc. 72

Elgood Concrete Forms, Corp. 64
Esso Standard Oil 18
Euclid Div., General Motors Corp. 66-67

Ford Motor Company, Ford Div. 12-15

Gardner-Denver Company 8-9
The Goodyear Tire & Rubber Co., Industrial Products Div. 28-29

International Harvester Co. (Motor Trucks) 76-77

Lehigh Portland Cement Company 30
Liberty Mutual Insurance Company 20
Lone Star Cement Corp. 37

Mack Trucks, Inc. 45-48
Macwhyte Company 55
McGraw-Hill Book Co., Inc. 91
Murphy Diesel Company 1

National Clay Pipe Manufacturers, Inc. 10
Northwest Engineering Co. 3

Ozalid Div., General Aniline & Film Corp. .. 11

Pacific Crane & Rigging Co. 69
Portland Cement Association 70-71
Posey Iron Works, Inc. 60

John A. Roebling's Sons Division, The Colorado Fuel and Iron Corporation 78

Sprague & Henwood, Inc. 72
Stacor Equipment Co. 64
Symons Clamp & Mfg. Co. 2

Templeton, Kenly & Co. 64
Texaco Inc. 4-5
Timber Structures, Inc. 6
The Timken Roller Bearing Co. ..... 4th Cov.
The Torrington Company 62
Tretol, Inc. 43

U. S. Steel Corp. 56-57

Warren-Knight Co. 55
The Weinman Pump Mfg. Co. 58
Williams Brothers 69
R. D. Wood Company 54

Professional Services 87-90

CLASSIFIED ADVERTISING

F. J. Eberle, Business Mgr.

Employment Opportunities 82-84
Notices
Proposals 80-82
Equipment
(Used or Surplus)
(For Rent, Sales Wanted) 84-86

ENGINEERING NEWS-RECORD

330 West 42 St., New York 36—LOngacre 4-3000

ABP Member ABC

Number of copies of this issue printed 87,152

D. S. ROBERTSON, Advertising Sales Manager
HUGH J. CARLSON, Assistant Business Manager

ADVERTISING REPRESENTATIVES

Atlanta, 9—1375 Peachtree St., N.E.
Robert H. Powell, Jr.

Boston, 16—McGraw-Hill Bldg., Copley Square
C. D. Neulen

Chicago, 11—520 No. Michigan Ave.
L. H. Hunt, W. G. Payne, Earl S. Moore, Jr.

Cleveland, 13—1164 Illuminating Bldg., 55 Public Square
H. A. Bergstrom, F. P. DiToro

Dallas, 1—Vaughn Bldg., 1712 Commerce St.,
John Grant

Denver, 2—Tower Building, 1700 Broadway
J. W. Patten

Detroit, 26—856 Penobscot Bldg.
R. I. Mace

Houston, 25—Prudential Bldg., Holcombe Blvd.—Joseph C. Page

Los Angeles, 17—1125 W. Sixth St.,
Knox Bourne, S. S. Tiebout

New York, 36—500 5th Ave.
C. D. Neulen, H. T. Olsen
Robert L. Barker

Philadelphia, 3—Six Penn Center Plaza
D. G. Jensen
Patrick Keleher

Pittsburgh, 22—4 Gateway Center
Malcolm Russell

Portland 4, Oregon—Room 445, Pacific Bldg.
Scott Hubbard

St. Louis, 8—Continental Bldg., 3615 Olive St.
E. B. Mingle, Jr.

San Francisco 11—255 California St.
John J. Hernan

OTHER SALES OFFICES:

United Kingdom, Edwin E. Murphy, 34 Dover Street, London W.1—Germany, Austria, Stan Kimes, 85 Westendstrasse, Frankfort/Main, Germany—Switzerland, Italy, France and Belgium, Michael R. Zeynel, 2 Place du Port, Geneva, Switzerland

Checklist of helpful McGRAW-HILL BOOKS

AERIAL PHOTOGRAPHIC INTERPRETATION

Covers methods and uses of aerial-photographic interpretation . . . and how it can be effectively applied to solve terrain-study problems in science and engineering. **By D. R. Lueder, Pres., Geotechnics and Resources, Inc. 452 pp., 256 illus., $17.50**

PROFESSIONAL ENGINEER'S EXAMINATION QUESTIONS AND ANSWERS

Just Out. Gives 600 questions and complete answers to help engineers pass state license examinations. **By W. S. La Londe, Newark Coll. of Eng. 2nd Ed., 615 pp., 273 illus., $7.50**

ERECTING STRUCTURAL STEEL

Just Out. Provides a wealth of methods and working information to help you effectively plan and erect a wide variety of steel structures. **By S. P. Oppenheimer, Prof. Engr. 272 pp., 111 illus., $9.50**

CONSTRUCTION ESTIMATES AND COSTS

Just Out. Covers every detail of the estimator's job—describes how to compute material, labor, equipment, and overhead costs for accurate estimates. **By H. E. Pulver, Consult. Engr. 3rd Ed., 640 pp., 126 illus., $12.00**

FLUORESCENT LIGHTING MANUAL

Just Out. A reference on the design, construction, and performance of fluorescent lamps. Includes data on calculating illuminating requirements. **By C. L. Amick, Day-Brite Lighting, Inc. 3rd Ed. 393 pp., 232 illus., 66 tables, $12.50**

PLUMBING, HEATING AND PIPING ESTIMATOR'S GUIDE

Shows how to make complete, accurate estimates in all areas of plumbing, heating, and piping work. **By P. G. Davis, Gamble, Pownall, and Gilroy. 208 pp., 94 tables and illus., $6.50**

ESTIMATING STRUCTURAL STEEL

Tested methods for compiling profitable bids on all types of construction—how to estimate columns, beams, trusses, welding, etc. **By G. A. Saunders, Lehigh Structural Steel Co. 274 pp., 176 illus., $9.50**

SEE THESE BOOKS TEN DAYS FREE

McGraw-Hill Book Co., Dept. ENR-3-16
327 W. 41st St., New York, 36, N. Y.

Send me book(s) checked below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep plus few cents for delivery costs, and return unwanted book(s) postpaid. (We pay delivery costs if you remit with this coupon—same return privilege.)

Lueder—**Aerial Photog. Intrpt.**—$17.50
LaLonde—**P.E. Exam. Ques. & Ans.**—$7.50
Oppenheimer—**Erect. Struct. Steel**—$9.50
Pulver—**Const. Est. & Costs**—$12.00
Amick—**Fluores. Light. Man.**—$12.50
Davis—**Plumb., Heat., & Pip. Est. Guide**—$6.50
Saunders—**Est. Struct. Steel**—$9.50

Name .....
Address .....
City ..... Zone.... State.....
Company .....
Position .....

For price and terms outside U.S. write McGraw-Hill Intl., N.Y.C. 36 ENR-3-16

Editorials

A New Pollution Agency

THE BILL INTRODUCED by Congressman John A. Blatnik to confer higher status on federal water-pollution control seeks a worthwhile objective. In essence the bill would take this activity out of the U.S. Public Health Service and elevate it to equal administrative level with the PHS within the Health, Education and Welfare Department (ENR Feb. 16, p. 23).

The change would have two important effects: It would stress the over-all importance of the problem; and it would shift the emphasis toward its engineering aspects.

The proposed new agency would have a status more in keeping with the growing public and official concern over water pollution. The whole topic would also gain a degree of prestige that might be more appealing to budget-conscious Congressmen and tax-conscious bond-issue voters.

A shift in emphasis from medical to engineering aspects might have less effect than higher status, but it weighs more heavily in the move to reorganize. The ascendancy of doctors under the present system nettles in some quarters.

It is true, as we have said before, that water pollution is not primarily a health problem in the U.S. The potential in that respect must not be discounted, but modern technology has the classic contaminants well in hand. The problem today is much broader. It is concerned with economics, esthetics, recreation. It deserves the broadest kind of executive interest. And for more effective action, the control agency needs all the prestige and rank it can get. We commend the Blatnik proposal to Congress.

Advisers Could Help

ONE OF THE SOUNDEST IDEAS the Kennedy Administration has come up with in connection with water use is the establishment of a standing Presidential advisory committee on natural resources. The Kennedy-Johnson Task Force on Natural Resources recommended the move in its January report to the incoming Administration, and early this month the President declared he would shortly order the new committee into being (ENR Mar. 2, p. 19).

Given vigorous leadership and the right kind of responsibilities, the committee can perform valuable service. It should have the responsibility of following through on such one-shot efforts as the National Conference on Water Pollution and the recently completed study of long-range U.S. water needs by the Senate Select Committee on National Water Resources.

Both of these undertakings were ambitious, arduous and potentially very productive. But the conference is over and its sponsors are out of office; and the Senate Select Committee is out of existence, its mission accomplished. Further action is up to others.

Without continuing review of the findings and recommendations resulting from the conference and the study, and without recurrent prodding of Congress and other action groups capable of turning the ideas into solid achievements, both efforts may come to nothing, and a like fate may await similar attempts in the future.

For Formwork Safety

SPECIFICATION WRITERS following the recently published recommendations of Committee 622 of the American Concrete Institute can dispel much of the fog often left between the architect-engineer's and the contractor's responsibility for concrete formwork. And if the specifications are vigorously enforced, improvements can result in the quality and safety of formwork construction, which the committee says is often "haphazard and unstandardized."

Committee 622 concludes, even after noting that only a few large contractors engineer their formwork, that formwork design and construction must remain the responsibility of the contractor. Such a policy gives the contractor the freedom he needs to produce an economical structure—through re-use of form panels and other techniques for saving labor and materials.

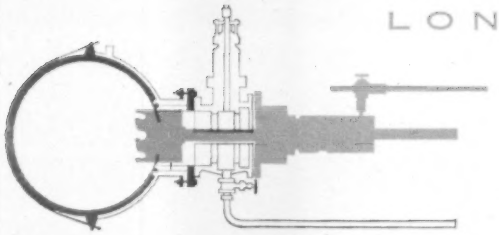
But the committee rejects the view, held by some contractors, that a performance specification relating to the finished structure is sufficient. For the vast majority of cast-in-place structures, the committee recommends specifications setting minimum design loads, allowable design stresses and dimensional tolerances. In addition, in special circumstances, the architect-engineer may wish to require approval of formwork design. And as an aid to all parties concerned, the report contains formulas for computing vertical and lateral loads for formwork design, and requirements for splicing shores and providing diagonal bracing.

Apart from safety, another objection to a performance specification on formwork is that, in many cases, its provisions are practically unenforcible. An inspector finding a formwork dimension ¼-in. out of tolerance can reasonably demand its correction. Discovering the same error after the forms are stripped is mainly of academic interest.

The committee also urges engineers to specify provisions for form-stripping and re-shoring. Moreover, the engineer should specify formwork materials, and even form ties and other accessories if he has special reasons to do so.

If architects and engineers will write the rigorous specifications recommended by ACI Committee 622, and put good inspectors in the field to enforce them, a long step will be taken to improve formwork safety, and thus reduce the number of failures.

LONG-TERM ECONOMY



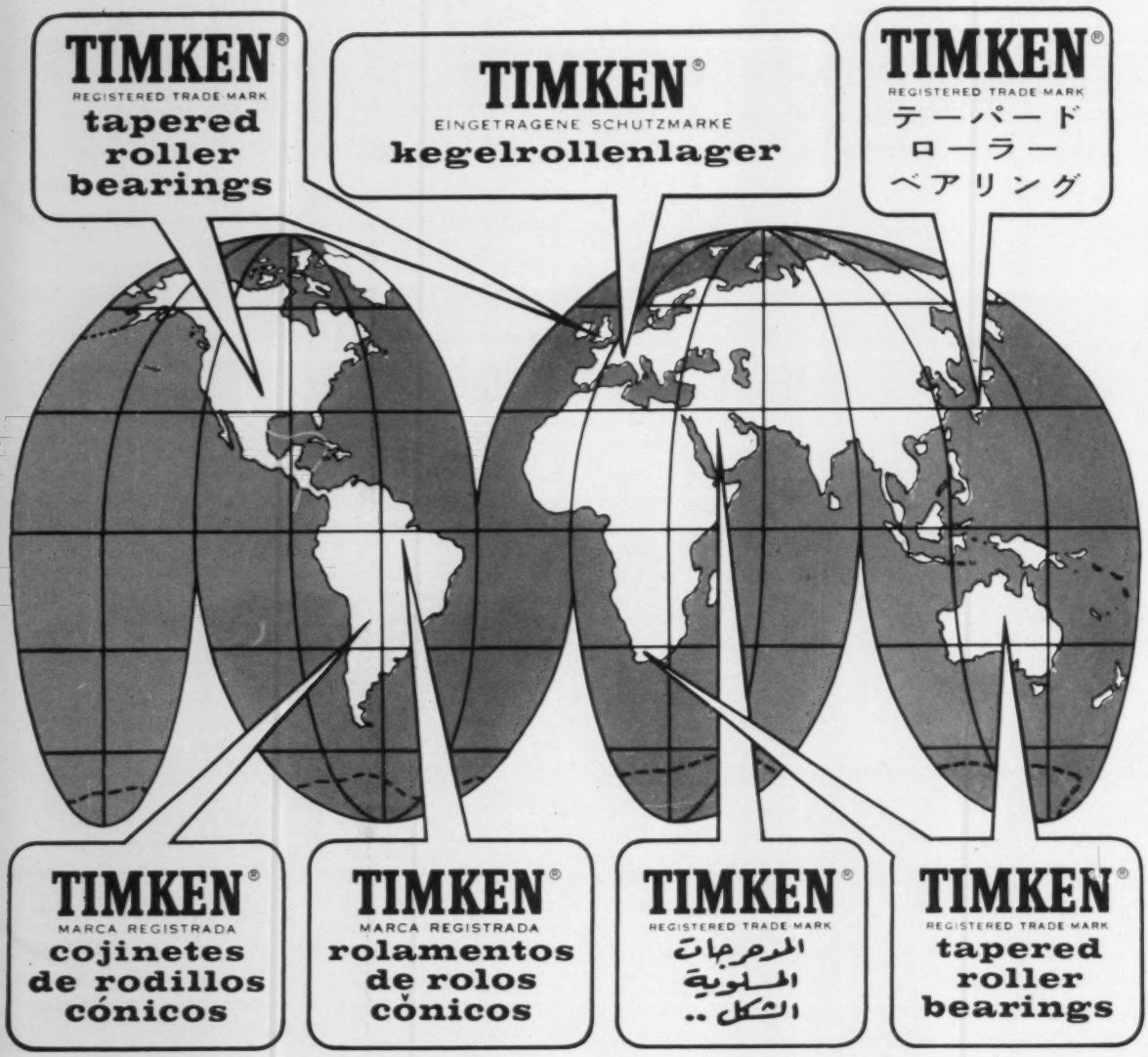
TAPPING UNDER PRESSURE

Pressure tapping Concrete Pressure Pipe is easy and economical. A small crew working with standard equipment can install a new outlet in a concrete pipeline in a few hours, without interrupting service to your customers. ■ Saddle type outlets are readily available for installation by your own forces or by others. Properly installed with protective concrete coatings, these outlets will be as durable and dependable as the pipeline itself. ■ To keep pace with the constant increase in demand for water, most municipalities and water agencies in the West have successfully expanded existing water supply systems by pressure tapping their concrete pipelines. ■ In addition to other assistance an American sales engineer will be glad to show you a motion picture film demonstrating the tapping procedure. The simplicity of pressure tapping is another reason why Concrete Pressure Pipe means long term economy for you.

American Pipe and Construction Co. · Los Angeles · San Diego · Hayward · Portland
Bogota, Colombia / **American Concrete Pipe Co.** (subsidiary) · Phoenix · Albuquerque

A MEMBER OF THE AMERICAN CONCRETE PRESSURE PIPE ASSOCIATION

American
PIPE AND CONSTRUCTION CO.



NO MATTER WHAT THE LANGUAGE, you're protected when the trade-mark "Timken" is on the bearings that support the loads in your machines. You're protected because Timken tapered roller bearings give long, trouble-free life in automobiles, machine tools, trains, farm equipment—wherever wheels and shafts turn.

And when you buy Timken bearings, you're assured of the engineering service of the world's most experienced and largest manufacturer of tapered roller bearings. The name "Timken" is a trade-mark identifying the bearings, steel and rock bits made by The Timken Roller Bearing Company and its subsidiaries and divisions the world over. The Timken Roller Bearing Company, Canton 6, Ohio, U.S.A. Cable address: "TIMROSCO". Timken bearings manufactured in U.S.A., Australia, Brazil, Canada, England and France.